

IMPERIAL COUNTY AIR POLLUTION CONTROL DISTRICT



**September 12, 2016 and September 13, 2016
Exceptional Event Documentation
For the Imperial County PM₁₀ Nonattainment Area**

FINAL DRAFT
December 11, 2018

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ACRONYM DESCRIPTIONS

AOD	Aerosol Optical Depth
AQI	Air Quality Index
AQS	Air Quality System
BACM	Best Available Control Measures
BAM 1020	Beta Attenuation Monitor Model 1020
BLM	United States Bureau of Land Management
BP	United States Border Patrol
CAA	Clean Air Act
CARB	California Air Resources Board
CMP	Conservation Management Practice
DCP	Dust Control Plan
DPR	California Department of Parks and Recreation
EER	Exceptional Events Rule
EPA	Environmental Protection Agency
FEM	Federal Equivalent Method
FRM	Federal Reference Method
GOES-W/E	Geostationary Operational Environmental Satellite (West/East)
HC	Historical Concentrations
HYSPLIT	Hybrid Single Particle Lagrangian Integrated Trajectory Model
ICAPCD	Imperial County Air Pollution Control District
INPEE	Initial Notification of a Potential Exceptional Event
ITCZ	Inter Tropical Convergence Zone
KBLH	Blythe Airport
KCZZ	Campo Airport
KIPL	Imperial County Airport
KNJK	El Centro Naval Air Station
KNYL/MCAS	Yuma Marine Corps Air Station
KPSP	Palm Springs International Airport
KTRM	Jacqueline Cochran Regional Airport (aka Desert Resorts Rgnl Airport)
PST	Local Standard Time
MMML/MXL	Mexicali, Mexico Airport
MODIS	Moderate Resolution Imaging Spectroradiometer
MPH	Miles Per Hour
MST	Mountain Standard Time
NAAQS	National Ambient Air Quality Standard
NCAR	National Center for Atmospheric Research
NCEI	National Centers for Environmental Information
NEAP	Natural Events Action Plan
NEXRAD	Next-Generation Radar
NOAA	National Oceanic and Atmospheric Administration
nRCP	Not Reasonably Controllable or Preventable
NWS	National Weather Service

PDT	Pacific Daylight Time
PM ₁₀	Particulate Matter less than 10 microns
PM _{2.5}	Particulate Matter less than 2.5 microns
PST	Pacific Standard Time
QA/QC	Quality Assured and Quality Controlled
QCLCD	Quality Controlled Local Climatology Data
RACM	Reasonable Available Control Measure
RAWS	Remote Automated Weather Station
SIP	State Implementation Plan
SLAMS	State Local Ambient Air Monitoring Station
SMP	Smoke Management Plan
SSI	Size-Selective Inlet
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UTC	Coordinated Universal Time
WRCC	Western Regional Climate Center

I Introduction

On September 12, 2016 and September 13, 2016, State and Local Ambient Air Monitoring Stations (SLAMS), located in Brawley (AQS Site Code 06-025-0007), Calexico (AQS Site Code 06-025-0005), El Centro (AQS Site Code 06-025-1003), and Westmorland (AQS Site Code 06-025-4003) California, measured exceedances of the National Ambient Air Quality Standard (NAAQS). The Federal Equivalent Method (FEM), Beta Attenuation Monitors Model 1020 (BAM 1020) measured (midnight to midnight) 24-hr average Particulate Matter less than 10 microns (PM₁₀) concentrations of 232 µg/m³, 164 µg/m³, 160 µg/m³, 180 µg/m³, and 179 µg/m³ (**Table 1-1**). PM₁₀ 24-hr measurements above 150 µg/m³ are exceedances of the NAAQS. Four of the five SLAMS located in Imperial County at Brawley, Calexico, El Centro, and Westmorland measured exceedances of the PM₁₀ NAAQS on September 12, 2016 and September 13, 2016.

TABLE 1-1
CONCENTRATIONS OF PM₁₀ ON SEPTEMBER 12, 2016 & SEPTEMBER 13, 2016

DATE	MONITORING SITE	AQS ID	POC(s)	HOURS	24-HOUR CONCENTRATION µg/m ³	PM ₁₀ NAAQS µg/m ³
9/12/2016	Brawley	06-025-0007	3	24	232	150
9/12/2016	Westmorland	06-025-4003	3	24	164	150
9/13/2016	Brawley	06-025-0007	3	24	160	150
9/13/2016	Calexico	06-025-0005	3	24	180	150
9/13/2016	El Centro	06-025-1003	4	24	179	150
9/12/2016	Calexico	06-025-0005	3	24	82	150
9/12/2016	El Centro	06-025-1003	4	24	106	150
9/12/2016	Niland	06-025-4004	3	24	75	150
9/13/2016	Niland	06-025-4004	3	24	93	150
9/13/2016	Westmorland	06-025-4003	3	24	82	150

*All time referenced throughout this document is in Pacific Standard Time (PST) unless otherwise noted¹

The Imperial County Air Pollution Control District (ICAPCD) has been submitting PM₁₀ data from Federal Reference Method (FRM) Size-Selective Instruments (SSI) since 1986 into the United States Environmental Protection Agency's (USEPA) Air Quality System (AQS). Prior to 2013 all continuous measured PM₁₀ data was non-regulatory, thus measured in local conditions. However, by 2013 ICAPCD began formally submitting continuous FEM PM₁₀ data from BAM 1020's into the USEPA managed AQS. Because regulatory consideration of reported data must be in standard conditions, as required by USEPA, all continuous PM₁₀ data since 2013 is

¹ According to the National Institute of Standards and Technology (NIST) Time and Frequency Division the designation of the time of day for specific time zones are qualified by using the term "standard time" or "daylight time". For year-round use the designation can be left off inferring "local time" daylight or standard whichever is present. For 2015 Pacific Daylight Time (PDT) is March 13 through November 6. <https://www.nist.gov/pml/time-and-frequency-division/local-time-faq#intl>

regulatory. On September 12, 2016 and September 13, 2016, the Brawley, Calexico, El Centro, and Westmorland monitors were impacted by elevated particulate matter caused by the entrainment of fugitive windblown dust from high winds associated with a strong upper level low pressure over the Pacific Northwest that moved over California and Nevada.

This report demonstrates that a naturally occurring event caused an exceedance observed on September 12, 2016 and September 13, 2016, which elevated particulate matter and affected air quality. The report provides concentration to concentration monitoring site analyses supporting a clear causal relationship between the event and the monitored exceedances and provides an analysis supporting the not reasonably controllable or preventable (nRCP) criteria. Furthermore, the report provides information that the exceedances would not have occurred without the entrainment of fugitive windblown dust from outlying deserts and mountains within the Sonoran Desert. The document further substantiates the request by the ICAPCD to exclude PM₁₀ 24-hour NAAQS exceedances of 232 µg/m³, 164 µg/m³, 160 µg/m³, 180 µg/m³, and 179 µg/m³ (**Table 1-1**) as an exceptional event. This demonstration substantiates that this event meets the definition of the USEPA Regulation for the Treatment of Data Influenced by Exceptional Events (EER).²

I.1 Demonstration Contents

Section II - Describes the September 12, 2016 and September 13, 2016 event as it occurred in California and into Imperial County, providing background information of the exceptional event and explaining how the wind driven emissions from the event led to the exceedance at the Brawley, Calexico, El Centro, and Westmorland monitors.

Section III – Using time-series graphs, summaries and historical concentration comparisons of the Brawley, Calexico, El Centro, and Westmorland stations this section discusses and establishes how the September 12, 2016 and September 13, 2016 event affected air quality such that a clear causal relationship is demonstrated between the event and the monitored exceedance. It is perhaps of some value to mention that the time-series graphs include PM₁₀ data measured in both local conditions and standard conditions. Measured PM₁₀ continuous data prior to 2013 is in local conditions, all other data is in standard conditions. The concentration difference between local and standard conditions has an insignificant impact on any data analysis. Overall, this section provides the evidence that human activity played little or no direct causal role in the September 12, 2016 and September 13, 2016 event and its resulting emissions defining the event as a “natural event”.³

Section IV - Provides evidence that the event of September 12, 2016 and September 13, 2016 was not reasonably controllable or preventable despite the full enforcement and implementation of Best Available Control Measures (BACM).

² "Treatment of Data Influenced by Exceptional Events; Final Guidance", 81 FR 68216, October 2, 2016

³ Title 40 Code of Federal Regulations part 50: §50.1(k) Natural event means an event and its resulting emissions, which may recur at the same location, in which human activity plays little or no direct causal role. For purposes of the definition of a natural event, anthropogenic sources that are reasonably controlled shall be considered to not play a direct role in causing emissions.

Section V - Brings together the evidence presented within this report to show that the exceptional event affected air quality; that the event was not reasonably controllable or preventable; that there was a clear causal relationship between the event and the exceedance, and that the event was a natural event.

I.2 Requirement of the Exceptional Event Rule

The above sections combined comprise the technical requirements described under the Exceptional Events Rule (EER) under 40 CFR §50.14(c)(3)(iv). However, in order for the USEPA to concur with flagged air quality monitoring data, there are additional non-technical requirements.

I.2.a Public Notification that a potential event was occurring (40 CFR §50.14(c)(1))

The ICAPCD published two separate advisories that included the San Diego and Phoenix NWS synopsis for September 12, 2016 and September 13, 2016 via the ICAPCD's webpage.

The September 12, 2016 advisory published the San Diego synopsis which identified the movement of the low-pressure system as southward into California and Nevada bringing stronger onshore flow. The stronger onshore flow was expected to create stronger and gusty southwest to west winds in the San Diego mountains and deserts during the afternoon and evening. Included with the September 12, 2016 published advisory a copy of the wind advisory for San Diego County deserts including the city of Borrego Springs. The notice included areas of west winds 15 to 25mph with gusts to 30mph and areas of blowing sand and blowing dust during the evening hours. The Phoenix synopsis indicated that a more predominant westerly flow would draw much drier air into the region beginning Tuesday, September 13, 2016.

The September 13, 2016 advisory published the San Diego synopsis which identified the strong and gusty southwest to west winds within the San Diego mountains and deserts as gradually diminish during the late evening hours while the low pressure over California and Nevada weakened as it moved east through Friday. The Phoenix office identified a moving weather disturbance that would result in breezy conditions and a much drier airmass over the region for the remainder of the week.

Due to the potential for suspended particles and poor air quality, the ICAPCD issued a "No Burn" day for Imperial County on September 12, 2016 and September 13, 2016. **Appendix A** contains copies of notices pertinent to the September 12, 2016 and September 13, 2016 event.

I.2.b Initial Notification of Potential Exceptional Event (INPEE) (40 CFR §50.14(c)(2))

States are required under federal regulation to submit measured ambient air quality data into the AQS. AQS is the federal repository of Quality Assured and Quality Controlled (QA/QC) ambient air data used for regulatory purposes. When States intend to request the exclusion of one or more exceedances of a NAAQS as an exceptional event a notification to the Administrator is required. The notification is accomplished by flagging the data in AQS and providing an initial

event description.

On October 3, 2016, the US EPA promulgated revisions to the Exceptional Events rule, which included the requirement of an “Initial Notification of Potential Exceptional Event” (INPEE) process. This revised INPEE process requires communication between the US EPA regional office and the State, prior to the development of a demonstration. The intent of the INPEE process is twofold: to determine whether identified data may affect a regulatory decision and whether a State should develop/submit an EE Demonstration.

The ICAPCD made a formal written request to the California Air Resources Board (CARB) to place preliminary flags on SLAMS measured PM₁₀ concentrations from the Brawley, Calexico, El Centro, and Westmorland monitors on April 17, 2017. The INPEE, for the September 12, 2016 and September 13, 2016 event, was formally submitted by the CARB to USEPA Region 9 on April 24, 2017. Subsequently there after a second revised request was sent to CARB requesting preliminary flags on additional days during 2016. **Table 1-1** above provides the PM₁₀ measured concentrations for all monitors in Imperial County for September 12, 2016 and September 13, 2016. The submitted request included a brief description of the meteorological conditions for September 12, 2016 and September 13, 2016 indicating that a potential natural event occurred.

I.2.c Documentation that the public comment process was followed for the event demonstration that was flagged for exclusion (40 CFR §50.14(c)(3)(v))

The ICAPCD posted, for a 30-day public review, a draft version of this demonstration on the ICAPCD webpage and published a notice of availability in the Imperial Valley Press on March 12, 2018. The notice advised the public that comments were being solicited regarding this demonstration, which supports the request, by the ICAPCD, to exclude the measured concentrations of 232 µg/m³, 164 µg/m³, 160 µg/m³, 180 µg/m³, and 179 µg/m³ which occurred on September 12, 2016 and September 13, 2016 in Brawley, Calexico, El Centro, and Westmorland (**Table 1-1**). The final closing date for comments was April 11, 2018. **Appendix A** contains a copy of the public notice affidavit along with any comments received by the ICAPCD for submittal as part of the demonstration (40 CFR §50.14(c)(3)(v)).

I.2.d Documentation submittal supporting an Exceptional Event Flag (40 CFR §50.14(c)(3)(i))

States that have flagged data as a result of an exceptional event and who have requested an exclusion of said flagged data are required to submit a demonstration that justifies the data exclusion to the USEPA in accordance with the due date established by USEPA during the INPEE process (40 CFR §50.14(c)(2)). Currently, bi-weekly meetings between USEPA, CARB and Imperial County are set to discuss each flagged exceedance for 2016.

The ICAPCD, after the close of the comment period and after consideration of the comments will submit this demonstration along with all required elements, including received comments and responses to USEPA Region 9 in San Francisco, California. The submittal of the September 12, 2016 and September 13, 2016 demonstration will have a regulatory impact upon the

development and ultimate submittal of the PM₁₀ State Implementation Plan for Imperial County in 2017.

I.2.e Necessary demonstration to justify an exclusion of data under (40 CFR§50.14(c)(3)(iv))

- A This demonstration provides evidence that the event, as it occurred on September 12, 2016 and September 13, 2016, satisfies the definition in 40 CFR §50.1(j) and (k) for an exceptional event.
 - a The event created the meteorological conditions that entrained emissions and caused the exceedance.
 - b The event clearly “affects air quality” such that there is the existence of a clear causal relationship between the event and the exceedance.
 - c Analysis demonstrates that the event-influenced concentrations compared to concentrations at the same monitor at other times supports the clear causal relationship.
 - d The event “is not reasonably controllable and not reasonably preventable.”
 - e The event is “caused by human activity that is unlikely to recur at a particular location or [is] a natural event.”
 - f The event is a “natural event” where human activity played little or no direct causal role.
- B This demonstration provides evidence that the exceptional event affected air quality in Imperial County by demonstrating a clear causal relationship between the event and the measured concentrations in Brawley, Calexico, El Centro, and Westmorland.
- C This demonstration provides evidence of the measured concentrations to concentrations at the same monitor at other times supporting the clear causal relationship between the event and the affected monitor.

II September 12, 2016 and September 13, 2016 Conceptual Model

This section provides a summary description of the meteorological and air quality conditions under which the September 12, 2016 and September 13, 2016 event unfolded in Imperial County. The subsection elements include

- » A description and map of the geographic setting of the air quality and meteorological monitors
- » A description of Imperial County's climate
- » An overall description of meteorological and air quality conditions on the event day.

II.1 Geographic Setting and Monitor Locations

According to the United States Census Bureau, Imperial County has a total area of 4,482 square miles of which 4,177 square miles is land and 305 square miles is water. Much of Imperial County is below sea level and is part of the Colorado Desert an extension of the larger Sonoran Desert (Figure 2-1). The Colorado Desert not only includes Imperial County but a portion of San Diego County.

**FIGURE 2-1
COLORADO DESERT AREA IMPERIAL COUNTY**



Fig 2-1: 1997 California Environmental Resources Evaluation System. According to the United States Geological Survey (USGS) Western Ecological Research Center the Colorado Desert bioregion is part of the bigger Sonoran Desert Bioregion which includes the Colorado Desert and Upper Sonoran Desert sections of California and Arizona, and a portion of the Chihuahuan Basin and Range Section in Arizona and New Mexico (Forest Service 1994)

A notable feature in Imperial County is the Salton Sea, which is at approximately 235 feet below sea level. The Chocolate Mountains are located east of the Salton Sea and extend in a northwest-southeast direction for approximately 60 miles (**Figure 2-2**). In this region, the geology is dominated by the transition of the tectonic plate boundary from rift to fault. The southernmost strands of the San Andreas Fault connect the northern-most extensions of the East Pacific rise. Consequently, the region is subject to earthquakes and the crust is being stretched, resulting in a sinking of the terrain over time.

FIGURE 2-2
SURROUNDING AREAS OF THE SALTON SEA



Fig 2-2: Image courtesy of the Image Science and Analysis Laboratory NASA Johnson Space Center, Houston Texas

All of the seven incorporated cities, including the unincorporated township of Niland, are surrounded by agricultural fields to the north, east, west and south (**Figure 2-6**). Together, the incorporated cities, including Niland, and the agricultural fields make what is known as the Imperial Valley. Surrounding the Imperial Valley are desert areas found on the eastern and western portions of Imperial County.

The desert area, found within the western portion of Imperial County is of note because of its border with San Diego County. From west to east, San Diego County stretches from the Pacific Ocean to its boundary with Imperial County. San Diego County has a varied topography. On its western side is 70 miles (110 km) of coastline. Most of San Diego between the coast and the Laguna Mountains consists of hills, mesas, and small canyons. Snow-capped (in winter)

mountains rise to the northeast, with the Sonoran Desert to the far east. Cleveland National Forest is spread across the central portion of the county, while the Anza-Borrego Desert State Park occupies most of the northeast. The southeastern portion of San Diego County is comprised of distinctive Peninsular mountain ranges. The mountains and deserts of San Diego comprise the eastern two-thirds of San Diego County and are primarily undeveloped back country with a native plant community known as chaparral. Of the nine major mountain ranges within San Diego County, the In-Ko-Pah Mountains and the Jacumba Mountains border Mexico and Imperial County.

Both mountain ranges provide the distinctive weathered dramatic piles of residual boulders that can be seen while driving Interstate 8 from Imperial County through Devil's Canyon and In-Ko-Pah Gorge. Interstate 8 runs along the US border with Mexico from San Diego's Mission Bay to just southeast of Casa Grande Arizona.

FIGURE 2-3
JACUMBA PEAK



Fig 2-3: The Jacumba Mountains reach an elevation of 4,512 feet (1,375 m) at Jacumba Peak, near the southern end of the chain. Source: Wikipedia at https://en.wikipedia.org/wiki/Jacumba_Mountains

Northwest and northeast of the Jacumba Mountains is the Tierra Blanca Mountains, the Sawtooth Mountains and Anza-Borrego Desert State Park. Within the mountain ranges and the Anza-Borrego Desert State Park, there exists the Vallecito Mountains, the Carrizo Badlands, the Carrizo Impact Area, Coyote Mountains and the Volcanic Hills to name of few. Characteristically, these areas all have erosion that has occurred over time that extends from the Santa Rosa Mountains into northern Baja California in Mexico. For example, the Coyote Mountains consists of sand dunes left over from the ancient inland Sea of Cortez. Much of the terrain is still loose dirt, interspersed with sandstone and occasional quartz veins. The nearest community to the Coyote Mountain range is the community of Ocotillo. Of interest are the fossilized and hollowed out sand dunes that produce wind caves.

FIGURE 2-4
ANZA-BORREGO DESERT STATE PARK
CARRIZO BADLANDS



Fig 2-4: View southwest across the Carrizo Badlands from the Wind Caves in Anza-Borrego Desert State Park. Source: Wikipedia at https://en.wikipedia.org/wiki/Carrizo_Badlands

The Carrizo Badlands, which includes the Carrizo Impact Area used by the US Navy as an air-to-ground bombing range during World War II and the Korean War, lies within the Anza-Borrego Desert State Park. The Anza-Borrego Desert State Park is located within the Colorado Desert, is the largest state park in California occupying eastern San Diego County, reaching into Imperial and Riverside counties. The two communities within Anza-Borrego Desert State Park are Borrego Springs and Shelter Valley.

The Anza-Borrego Desert State Park lies in a unique geologic setting along the western margin of the Salton Trough. The area extends north from the Gulf of California to San Geronio Pass and from the eastern rim of the Peninsular Ranges eastward to the San Andreas Fault zone along the far side of the Coachella Valley. The Anza-Borrego region changed gradually over time from intermittently being fed by the Colorado River Delta to dry lakes and erosion from the surrounding mountain ranges. The area located within the southeastern and northeastern section of San Diego County is a source of entrained fugitive dust emissions that impact Imperial County when westerly winds funnel through the unique landforms causing in some cases wind tunnels that cause increases in wind speeds.

Historical observations have indicated that the desert slopes and mountains of San Diego are a source of fugitive emissions along with those deserts located to the east and west of Imperial County, which extend into Mexico (Sonoran Desert, **Figure 2-7**). Combined, the desert areas and mountains of San Diego and the desert areas that extend into Mexico are sources of dust emissions, which affect the Imperial County during high wind events.

FIGURE 2-5
ANZA-BORREGO DESERT STATE PARK
DESERT VIEW FROM FONT'S POINT



Fig 2-5: Desert view from Font's Point. Source: Font's Point Anza-Borrego Photographed by and copyright of (c) David Corby; Wikipedia at https://en.wikipedia.org/wiki/Anza-Borrego_Desert_State_Park

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FIGURE 2-7
DESERTS IN CALIFORNIA, YUMA AND MEXICO

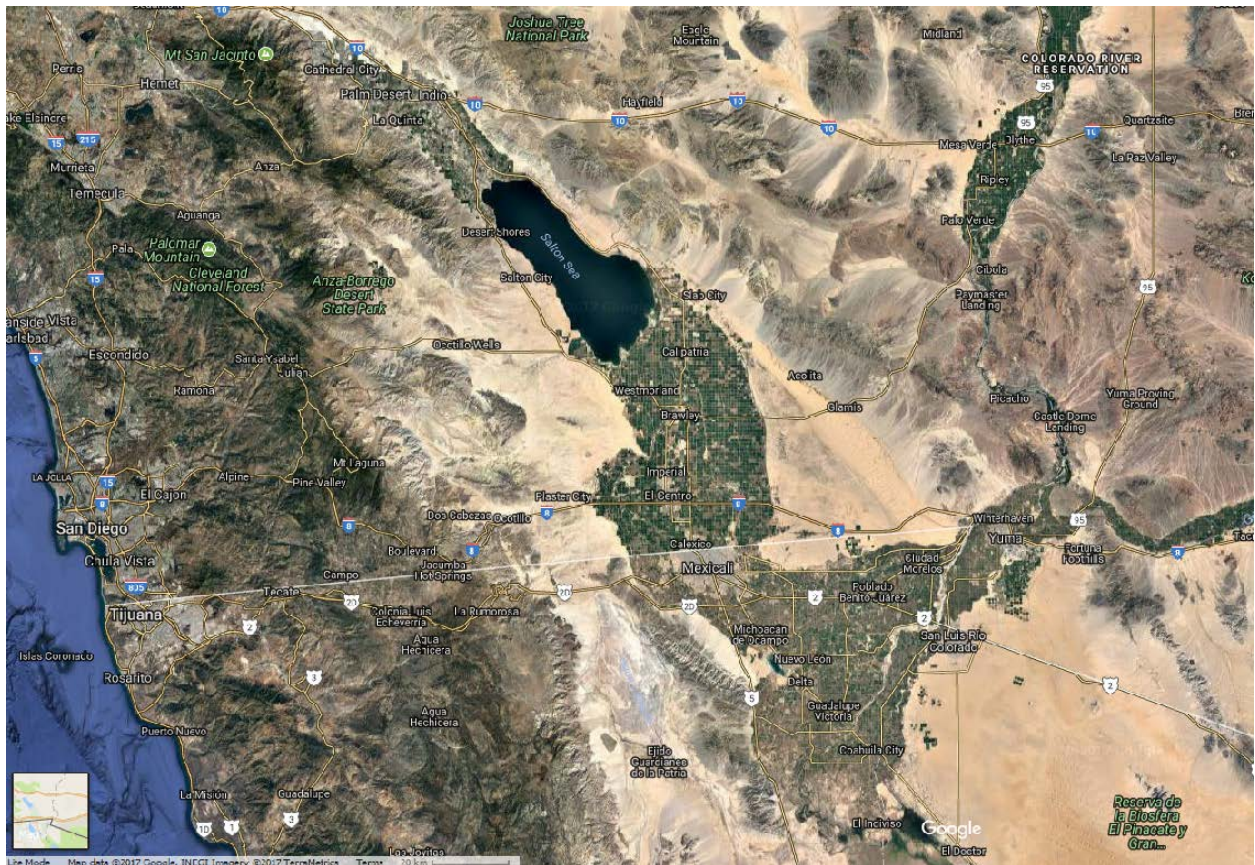


Fig 2-7: Depicts the Sonoran Desert as it extends from Mexico into Imperial County.

Source: Google Earth Terra Metrics

The air quality and meteorological monitoring stations used in this demonstration are shown in **Figure 2-8**. Of the five SLAMS within Imperial County four stations measure both meteorological and air quality data. These SLAMS are located in Calexico, El Centro, Westmorland, and Niland; the station located in Brawley only measures air quality. Other air monitoring stations measuring air quality and meteorological data used for this demonstration include stations in eastern Riverside County, southeastern San Diego County and southwestern Arizona (Yuma County) (**Figure 2-8 and Table 2-1**).

As mentioned above, the PM₁₀ exceedances on September 12, 2016 and September 13, 2016, occurred at the Brawley, Calexico, El Centro, and Westmorland stations. The Brawley, Niland, and Westmorland stations are regarded as the “northern” monitoring sites within the Imperial County air monitoring network. In order to properly analyze the contributions from meteorological conditions occurring on September 12, 2016 and September 13, 2016, other meteorological sites were used in this demonstration which include airports in eastern Riverside County, southeastern San Diego County, southwestern Arizona (Yuma County), Imperial County, and other sites relevant to the wind event, such as within northern Mexico. (**Figure 2-8 and Appendix B**).

FIGURE 2-8
MONITORING SITES IN AND AROUND IMPERIAL COUNTY

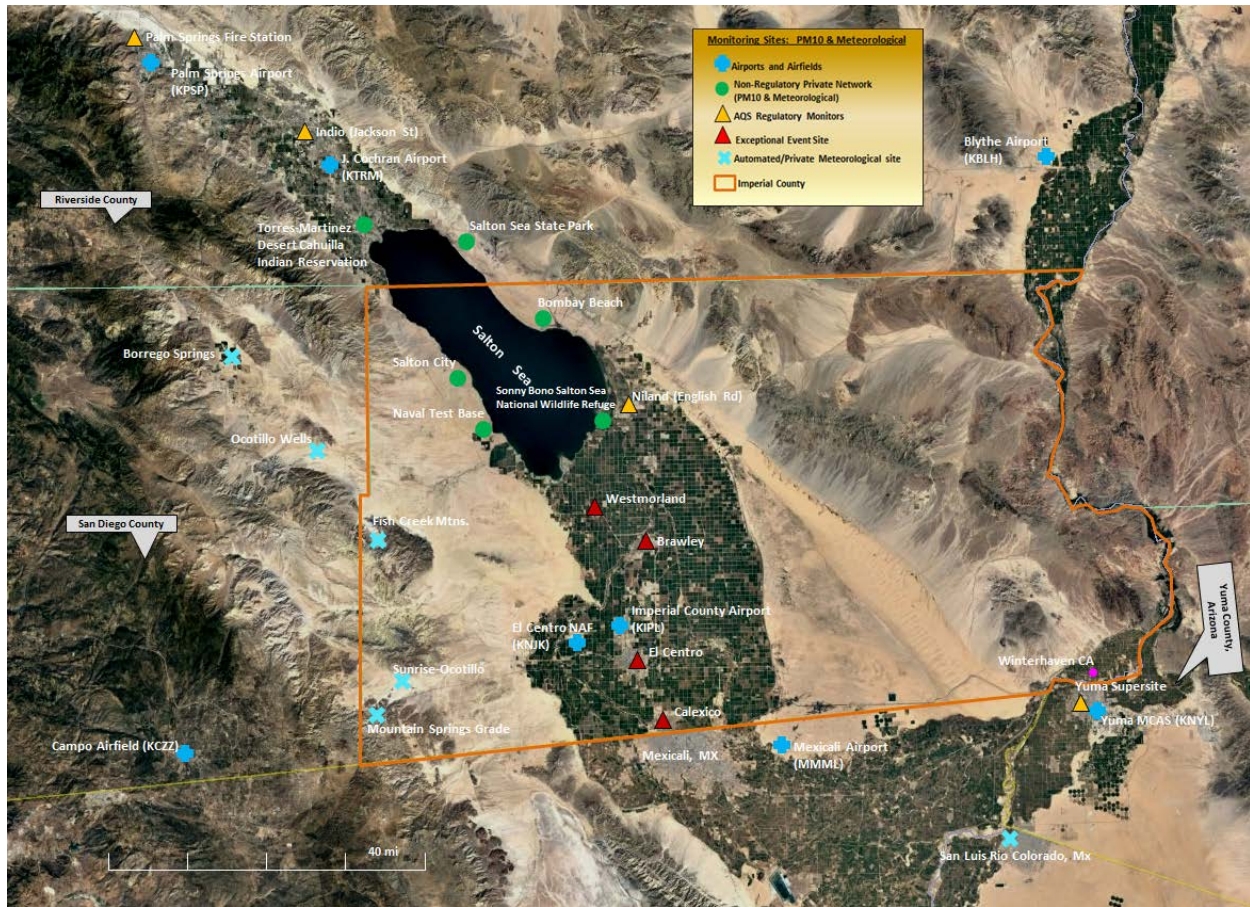


Fig 2-8: Depicts a select group of meteorological and PM₁₀ monitoring sites in Imperial County, eastern Riverside County, southeastern San Diego County, southwestern Arizona (Yuma County), and northern Mexico. The image provides the location of potential sites used to gather data in support an Exceptional Event Demonstration. Source: Google Earth

In addition to meteorological sites, there are non-regulatory PM₁₀ sites located around the Salton Sea that maybe referenced as an aid to help the reader understand the direction and velocity of winds that affect Imperial County. Unless, otherwise specifically indicated concentration references do not imply emissions from the surrounding playa of the Salton Sea. Three sites, in specific, are the Salton City air monitoring station, the Naval Test Base air monitoring station and the Sonny Bono air monitoring station. These privately owned stations are non-regulatory (**Figures 2-9 to 2-12**). The Salton City station is located 33.27275°N latitude and 115.90062°W longitude, on the western edge of the Salton Sea (**Figure 2-9**). The station abuts a water reservoir along the Salton Sea with surrounding chaparral vegetation and unpaved open areas and roads. The Naval Test Base station is located 33.16923°N latitude and 115.85593°W longitude, on the southwestern edge of the Salton Sea (**Figure 2-11**). The station sits on an abandoned US Military site, still owned by the Department of Defense. Unlike the Salton City station, light chaparral

vegetation and sandy open dune areas surround the Naval Test Base station. Directly to the west of the station is an orchard. The Sonny Bono station is located 33.17638°N latitude and 115.62310°W longitude, on the southern portion of the Salton Sea within the Sonny Bono Salton Sea Wildlife Refuge. The Sonny Bono Salton Sea National Wildlife Refuge is 40 miles north of the Mexican border at the southern end of the Salton Sea within the Sonoran Desert. The Refuge has two separate managed units, 18 miles apart. Each unit contains wetland habitats, farm fields, and tree rows. The land of the Salton Sea Refuge is flat, except for Rock Hill, a small, inactive volcano, located near Refuge Headquarters. Bordering the Refuge is the Salton Sea on the north and farmlands on the east, south, and west.

FIGURE 2-9
SALTON CITY AIR MONITORING STATION

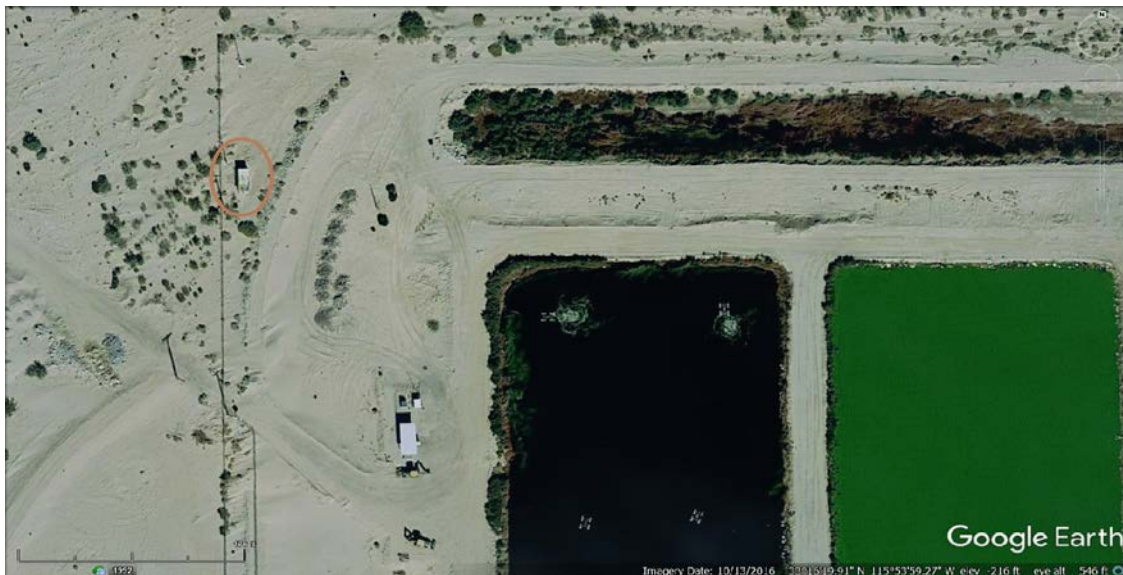


Fig 2-9: Depicts the Salton City air monitoring (circled) site operated by a private entity. Site photos can be seen at the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-10
SALTON CITY AIR MONITORING STATION
WEST



Fig 2-10: Photograph taken by the California Air Resources Board audit team in 2017. The photograph is taken from the west facing the probe.
https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-11
NAVAL TEST BASE AIR MONITORING STATION



Fig 2-11: Depicts the Naval Test Base air monitoring (circled) site operated by a private entity. To view the site photos visit the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13603&date=17

FIGURE 2-12
NAVAL TEST BASE AIR MONITORING STATION
WEST



Fig 2-12: Photograph taken by the California Air Resources Board audit team in 2017. The photograph is taken from the west facing the probe.
https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-13
SONNY BONO AIR MONITORING STATION



Fig 2-13: Depicts the Sonny Bono air monitoring (circled) site operated by a private entity. To view the site photos visit the California Air Resources Board monitoring website at
https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-14
SONNY BONO SALTON SEA NATIONAL WILDLIFE REFUGE

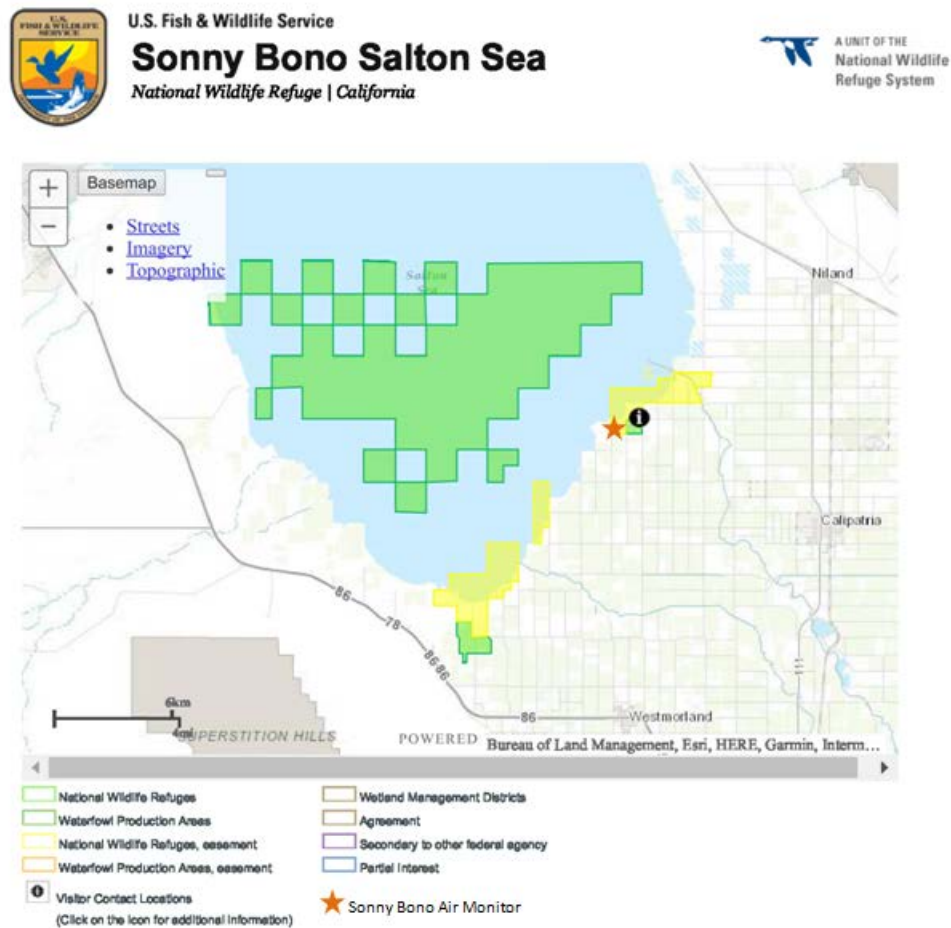


Fig 2-14: The Sonny Bono Wildlife Refuge has about 2,000 acres that are farmed and managed for wetlands. In 1998, the Refuge was renamed after Congressman Sonny Bono, who helped inform the U.S. Congress of the environmental issues facing the Salton Sea as well as acquiring funding for this Refuge to help it respond to avian disease outbreaks and other habitat challenges at the Salton Sea. Source: https://www.fws.gov/refuge/Sonny_Bono_Salton_Sea/about.html

TABLE 2-1
MONITORING SITES IN IMPERIAL COUNTY, RIVERSIDE COUNTY AND ARIZONA
SEPTEMBER 12, 2016 AND SEPTEMBER 13, 2016

Monitor Site Name	*Operator	Monitor Type	AQS ID	AQS PARAMETER CODE	ARB Site Number	Elevation (meters)	Day	24-hr PM ₁₀ (µg/m³) Avg***	1-hr PM ₁₀ (µg/m³) Max	**Time of Max Reading	Max Wind Speed (mph)	**Time of Max Wind Speed
IMPERIAL COUNTY												
Brawley-Main Street #2	ICAPCD	Hi-Vol Gravimetric	06-025-0007	81102	13701	-15	12	-	-	-	-	-
		BAM 1020					232	773	19:00			
		Hi-Vol Gravimetric					13	-	-	-	-	-
		BAM 1020					160	760	02:00			
Calexico-Ethel Street	CARB	BAM 1020	06-025-0005	81102	13698	3	12	82	315	15:00	14.7	16:00
							13	180	483	08:00	11.6	09:00
El Centro-9th Street	ICAPCD	BAM 1020	06-025-1003	81102	13694	9	12	107	384	22:00	15.1	16:00
							13	179	867	02:00	15.8	09:00
Niland-English Road	ICAPCD	Hi-Vol Gravimetric	06-025-4004	81102	13997	-54	12	-	-	-	18.4	16:00
		BAM 1020					75	432	18:00			
		Hi-Vol Gravimetric					13	-	-	-	20.1	17:00
		BAM 1020					93	310	18:00			
Westmorland	ICAPCD	BAM 1020	06-025-4003	81102	13697	-43	12	164	599	21:00	15.2	22:00
							13	83	287	16:00	13.7	16:00
RIVERSIDE COUNTY												
Palm Springs Fire Station	SCAQMD	TEOM	06-065-5001	81102	33137	174	12	29	66	18:00	-	-
							13	25	51	13:00	-	-
Indio (Jackson St.)	SCAQMD	TEOM	06-065-2002	81102	33157	1	12	50	184	20:00	12	17:00
							13	79	324	07:00	14.7	07:00
ARIZONA – YUMA												
Yuma Supersite	ADEQ	TEOM	04-027-8011	81102	N/A	60	12	62	288	17:00	-	-
							13	90	149	10:00	-	-

*CARB = California Air Resources Board

*ICAPCD = Air Pollution Control District, Imperial County

*SCAQMD = South Coast Air Management Quality District

*ADEQ = Arizona Department of Environmental Quality

**Time represents the actual time/hour of the measurement in question according to the zone time (PST unless otherwise noted)

September 12, 2016 and September 13, 2016 was not a scheduled run day

II.2 Climate

As mentioned above, Imperial County is part of the Colorado Desert, which is a subdivision of the larger Sonoran Desert (**Figure 2-15**) encompassing approximately 7 million acres (28,000 km²). The desert area encompasses Imperial County and includes parts of San Diego County, Riverside County, and a small part of San Bernardino County.

FIGURE 2-15
SONORAN DESERT REGION

The Sonoran Desert Region consists of the Sonoran Desert itself plus the surrounding biological communities, including the Sea of Cortez (Gulf of California) and its islands

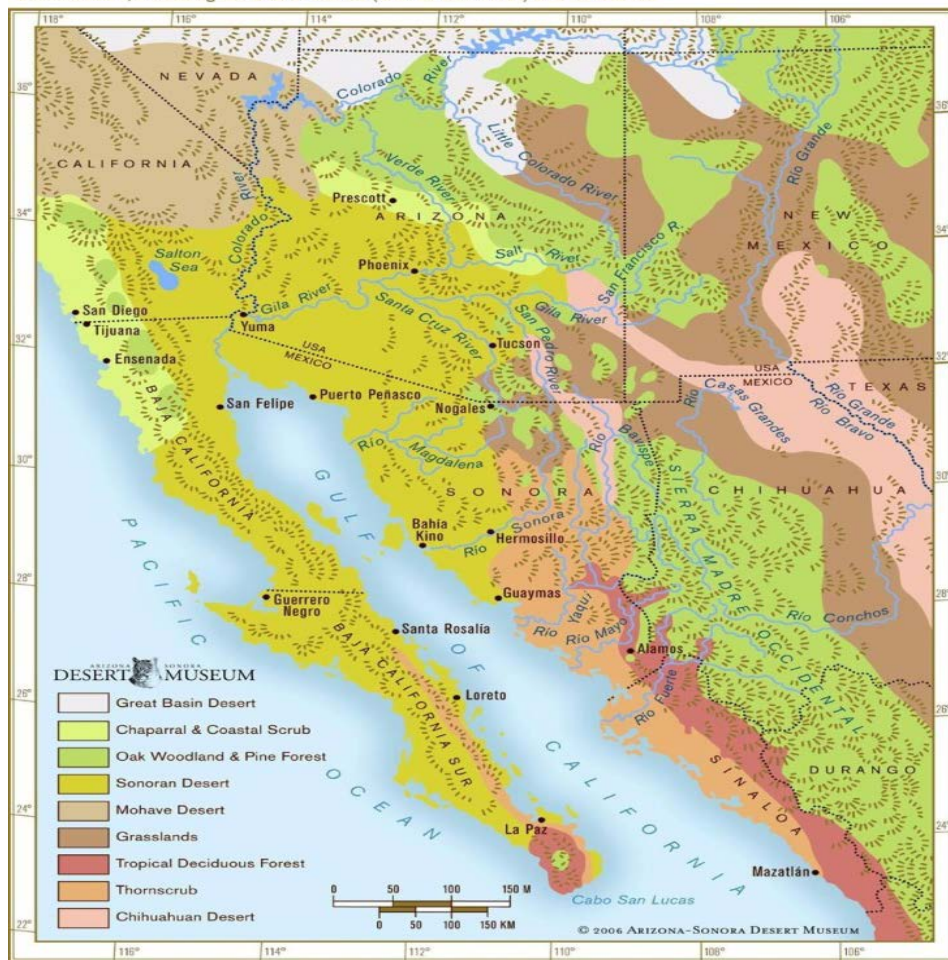


Fig 2-15: Depicts the magnitude of the region known as the Sonoran Desert. Source: Arizona-Sonora Desert Museum at <http://desertmuseum.org/center/map.php>

The majority of the Colorado Desert lies at a relatively low elevation, below 1,000 feet (300 m), with the lowest point of the desert floor at 275 feet (84 m) below sea level at the Salton Sea. Although the highest peaks of the Peninsular Range reach elevations of nearly 10,000 feet (3,000 m), most of the region's mountains do not exceed 3,000 feet (910 m).

In the Colorado Desert (Imperial County), the geology is dominated by the transition of the tectonic plate boundary from rift to fault. The southernmost strands of the San Andreas Fault connect to the northern-most extensions of the East Pacific Rise. Consequently, the region is subject to earthquakes, and the crust is being stretched, resulting in a sinking of the terrain over time.

The Colorado Desert's climate distinguishes it from other deserts. The region experiences greater summer daytime temperatures than higher-elevation deserts and almost never experiences frost. In addition, the Colorado Desert experiences two rainy seasons per year (in the winter and late summer), especially toward the southern portion of the region which includes a portion of San Diego County. The Colorado Desert portion of San Diego County receives the least amount of precipitation. Borrego Springs, the largest population center within the San Diego desert region averages 5 inches of rain with a high evaporation rate. By contrast, the more northerly Mojave Desert usually has only winter rains.

The west coast Peninsular Ranges, or other west ranges, of Southern California—northern Baja California, block most eastern Pacific coastal air and rains, producing an arid climate. Other short or longer-term weather events can move in from the Gulf of California to the south, and are often active in the summer monsoons. These include remnants of Pacific hurricanes, storms from the southern tropical jet stream, and the northern Inter Tropical Convergence Zone (ITCZ).

The arid nature of the region is demonstrated when historic annual average precipitation levels in Imperial County average 2.64" (**Figure 2-16**). During the 12-month period prior to the September 12, 2016 and September 13, 2016 event, Imperial County measured a total annual precipitation of 0.83 inches. Such arid conditions, as those preceding the event, result in soils that are particularly susceptible to particulate suspension by the elevated gusty winds.

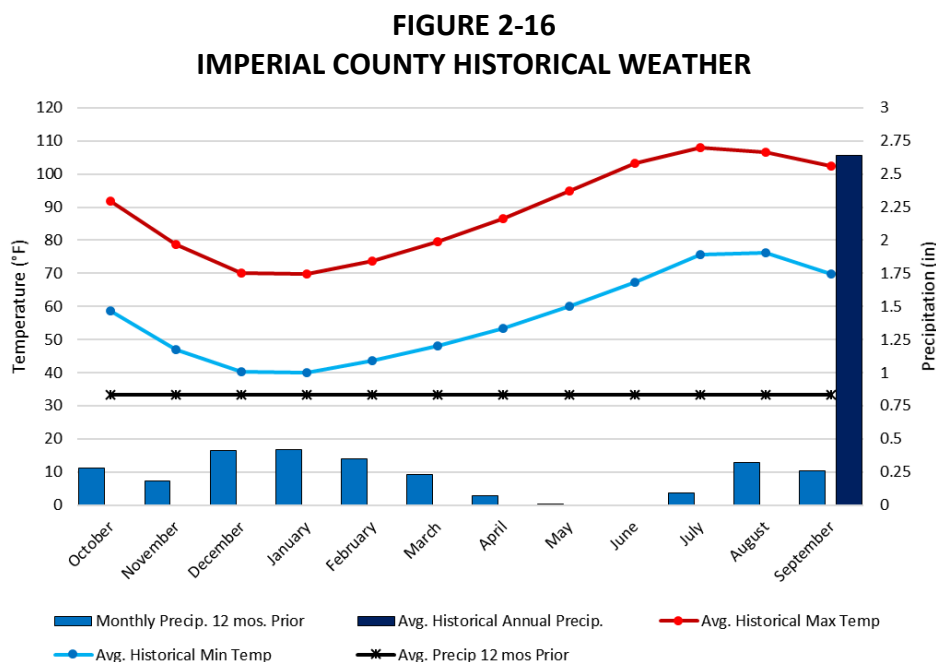


Fig 2-16: Historical Imperial County weather. Prior to September 12, 2016 and September 13, 2016, the region suffered abnormally low total precipitation of 0.83 inches. Average annual precipitation is 2.64 inches. Meteorological data courtesy of Western Regional Climate Center (WRCC) and Weather Underground <http://www.wrcc.dri.edu/cgi-bin/climain.pl?ca2713>

The NWS explains that the speed of any wind resulting from a weather system is directly proportional to the change in air pressure, called a pressure gradient, such that when the pressure gradient increases so does the speed of the wind.⁴ Because the pressure gradient is just the difference in pressure between high and low-pressure areas, changes in weather patterns may recur seasonally.

Typically, high pressure brings clear skies and with no clouds, there is more incoming shortwave solar radiation causing temperatures to rise. When surface winds become light, the cooling of the air produced directly under a high-pressure system can lead to a buildup of particulates in urban areas under an elongated region of relatively high atmospheric pressure or ridge causing widespread haze. Conversely, a trough is an elongated region of relatively low atmospheric pressure often associated with fronts. Troughs may be at the surface, or aloft under various conditions. Most troughs bring clouds, showers, and a wind shift, particularly following the passage of the trough.

While windblown dust events in Imperial County during the summer monsoon season are often due to outflow winds from thunderstorms, windblown dust events in the fall, winter, and spring are usually due to strong winds associated with low-pressure systems and cold fronts moving southeast across California. These winds are the result of strong surface pressure gradients between the approaching low-pressure system, accompanying cold front, and higher pressure ahead of it. As the low-pressure system and cold front approaches and passes, gusty southwesterly winds typically shift to northwesterly causing variable west winds. These strong winds entrain dust into the atmosphere and transport it over long distances, especially when soils are arid.

II.3 Event Day Summary

The exceptional event for September 12, 2016 and September 13, 2016, which was caused by a low-pressure system over the Pacific Northwest that moved southward into California and Nevada on Monday and Tuesday brought stronger onshore flow with periods of gusty southwest to west winds in the San Diego mountains and deserts during the afternoon and evening hours. For each afternoon and evening hours the strongest winds blew near the San Diego County mountain ridge tops and along desert mountain slopes into adjacent desert areas. On September 12, 2016 and September 13, 2016 gusty southwest to west winds blew across southeastern California as the system moved through the region affecting air quality and causing exceedances in Brawley, Calexico, El Centro and Westmorland.

Figures 2-17 through 2-18 provides information regarding the strengthening of the low and the subsequent tightening of the surface gradients on September 12, 2016 and September 13, 2016. As the onshore flow strengthened the gradients tightened creating gusty southwest to west winds across southeastern California as the low pressure moved east.

⁴ NWS JetStream – Origin of Wind <http://www.srh.noaa.gov/jetstream/synoptic/wind.html>

FIGURE 2-17
GOES-WEST & EAST INFRARED IMAGES
TIGHTENING SURFACE GRADIENT OVER SOUTHEASTERN CALIFORNIA

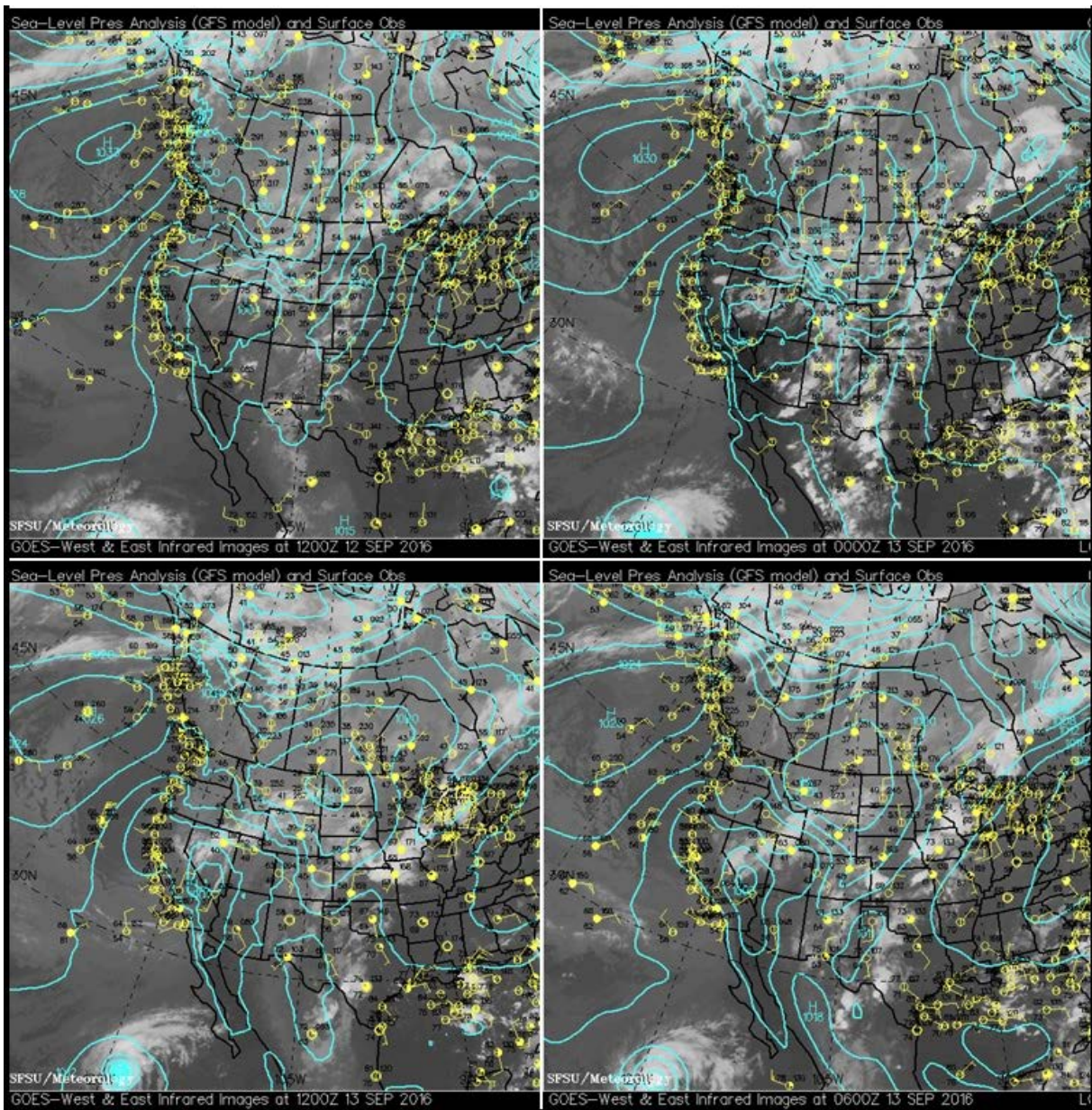
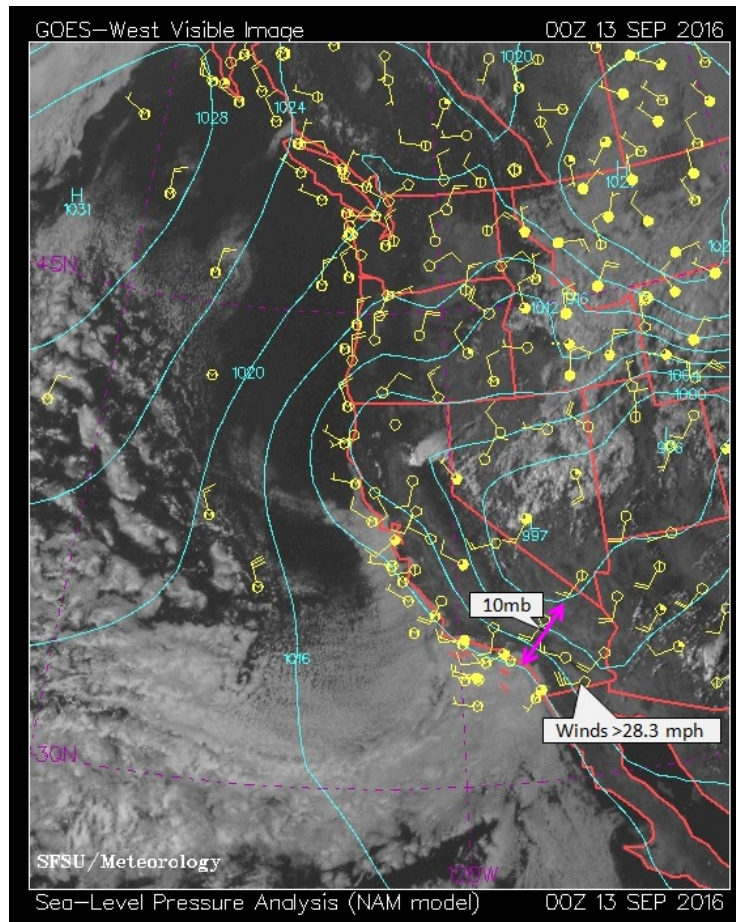


Fig 2-17: A quad of CONUS infrared satellite images show gradients beginning to tighten at 0400 PST on September 12, 2016 (top left) with increased packing by 1600 PST (top right). The gradient relaxed slightly at 2200 PST (bottom right), then tightened by 0400 PST on September 13, 2016 (bottom left). Source: http://virga.sfsu.edu/archive/composites/sathts_snd/1609

FIGURE 2-18
GOES-WEST VISIBLE IMAGE
PACKED SURFACE GRADIENT OVER SOUTHEASTERN CALIFORNIA



San Diego NWS office issued seven Urgent Weather messages containing wind advisories for the San Diego County mountains and deserts, including the city of Borrego Springs, which included forecasted southwest to west winds 15 to 25mph with gust to 45mph. **Figures 2-19 and 2-20** are graphical illustrations of the chain of events for September 12, 2016 and September 13, 2016.

FIGURE 2-19
RAMP-UP ANALYSIS SEPTEMBER 12, 2016

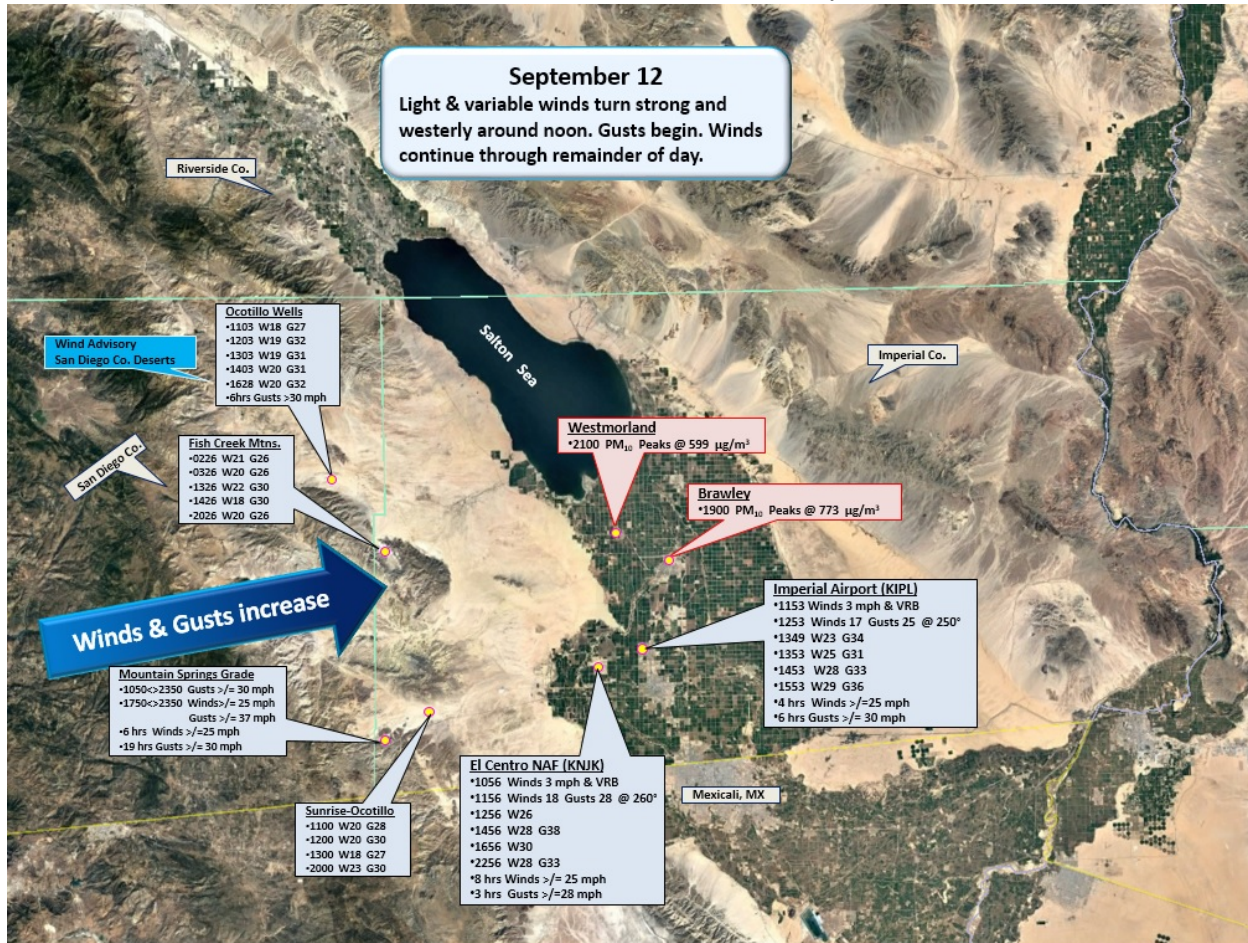


Fig 2-19: As the system moved eastward southwest to west winds increased around noon. The increase in winds was accompanied by powerful gusts. Both the Brawley and Westmorland monitors measured elevated PM₁₀ by as early as 11:00am PST and continue through the evening. Google Earth base map

FIGURE 2-20
RAMP-UP ANALYSIS SEPTEMBER 13, 2016

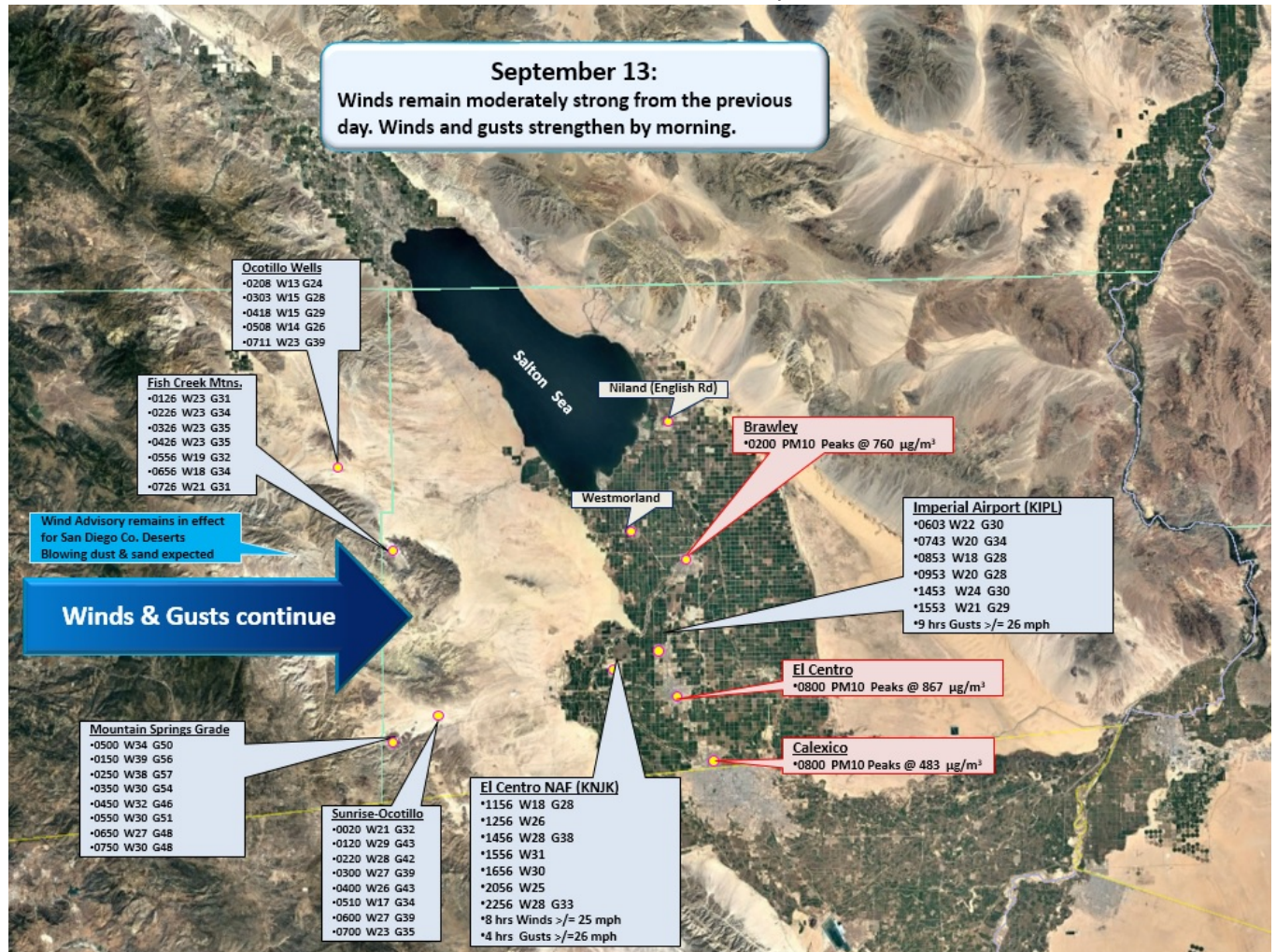


Fig 2-20: Winds remained moderately strong in the early morning hours of September 13, 2016 and then increased around daybreak. The substantial amount of windblown dust suspended the previous day carried over the following day, September 13, 2016, causing elevated PM₁₀ concentrations primarily during the morning hours. Google Earth base map

Table 2-2 contains a summary of maximum winds, peak wind gusts, and wind direction at monitors in Imperial County, eastern Riverside County, Yuma County, Arizona, and Mexicali. For detailed meteorological station, graphs see **Appendix B**.

TABLE 2-2
WIND SPEEDS ON SEPTEMBER 12, 2016 AND SEPTEMBER 13, 2016

Station Monitor Airport Meteorological Data	Day	Maximum Wind Speed (WS) (mph)	Wind Direction during Max WS (degrees)	*Time of Max Wind Speed	24 hr Maximum Wind Gust (WG) (mph)	Time of Max WG	PM ₁₀ correlated to time of Max Wind Speed				
IMPERIAL COUNTY											
Imperial Airport (KIPL)	12	29	270	15:53	36	15:53	351	209	141	315	237
	13	24	260	14:53	34	7:43	91	147	42	52	89
Naval Air Facility (KNJK)	12	31	270	15:56	38	14:56	351	209	141	315	237
	13	29	280	6:56	40	7:56	104	99	83	236	-
Calexico (Ethel St)	12	14.7	293	16:00	-	-	346	225	103	174	242
	13	11.6	315	16:00	-	-	343	287	173	75	76
El Centro (9th Street)	12	15.1	280	16:00	-	-	346	225	103	174	242
	13	15.8	276	9:00	-	-	94	59	84	423	563
Niland (English Rd)	12	18.4	265	16:00	-	-	346	225	103	174	242
	13	20.1	265	19:00	-	-	80	45	117	57	86
Westmorland	12	15.2	281	22:00	-	-	614	222	10	104	384
	13	13.7	293	16:00	-	-	343	287	173	75	76
RIVERSIDE COUNTY											
Blythe Airport (KBLH)	12	24	220	13:52	38	15:52	502	501	34	34	106
	13	22	220	14:52	29	14:52	91	147	42	52	89
Palm Springs Airport (KPSP)	12	26	320	18:53	40	18:53	149	147	432	104	137
	13	28	320	13:53	40	13:53	76	92	46	43	37
Jacqueline Cochran Regional Airport (KTRM) - Thermal	12	18	340	17:52	28	18:52	267	345	207	117	146
	13	20	340	18:52	26	18:52	55	51	310	76	76
ARIZONA - YUMA											
Yuma MCAS (KNYL)*MST	12	16	160	7:57	23	13:57	43	41	10	103	54
	13	14	310	10:57	20	20:57	112	65	83	414	234
MEXICALI - MEXICO											
Mexicali Int. Airport (MXL)	12	19.6	310	16:50	-	-	346	225	103	174	242
	13	25.3	310	8:48	-	-	44	38	102	48	64

*All time referenced throughout this document is in Pacific Standard Time (PST) unless otherwise noted

The National Oceanic and Atmospheric Administration (NOAA) Air Resources Laboratory HYSPLIT back trajectory models⁷ depicted in **Figures 2-21 and 2-22** indicate the general path of airflow as it approached the Brawley (blue icon) and Westmorland (red icon) monitors and the Brawley (blue icon), Calexico (green icon), and El Centro (red icon) monitors, six hours prior to 1200 PST on September 12, 2016 and 12 hours prior to 0800 PST on September 13, 2016. The ending hour of 1200 PST on September 12, 2016 represents the hour that the Brawley monitor began

⁷ The Hybrid Single Particle Lagrangian Integrated Trajectory Model (**HYSPLIT**) is a computer model that is a complete system for computing simple air parcel trajectories to complex dispersion and deposition simulations. It is currently used to compute air parcel trajectories and dispersion or deposition of atmospheric pollutants. One popular use of HYSPLIT is to establish whether high levels of air pollution at one location are caused by transport of air contaminants from another location. HYSPLIT's back trajectories, combined with satellite images (for example, from NASA's [MODIS](#) satellites), can provide insight into whether high air pollution levels are caused by local air pollution sources or whether an air pollution problem was blown in on the wind. The initial development was a result of a joint effort between NOAA and Australia's Bureau of Meteorology. Source: NOAA/Air Resources Laboratory, 2011.

measuring elevated concentrations of PM₁₀. The ending hour of 0800 PST on September 13, 2016 represents the peak hourly concentrations measured at the El Centro and Calexico monitors. The southwest to west airflow on both days over the mountains and desert slopes of San Diego County along with gusty elevated wind speeds provided the ideal conditions for the air monitoring stations to measure elevated concentrations of PM₁₀ on September 12, 2016 (evening hours) and September 13, 2016 (generally morning hours). It is of some worth to point out that from time to time modeled winds differ from local conditions. Data used in the HYSPLIT model has a horizontal resolution of 12 km and integrated every three hours. Thus, the HYSPLIT model may differ from local observed surface wind speeds and directions.

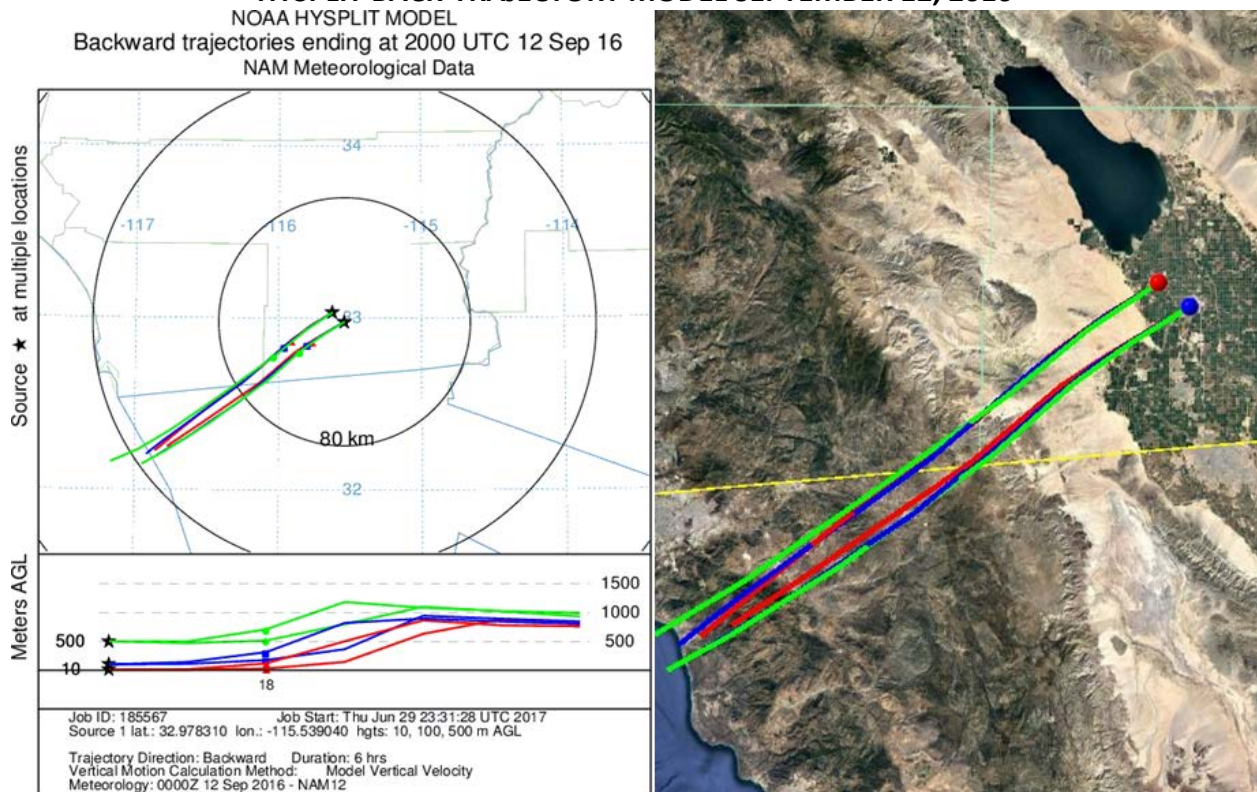
FIGURE 2-21**HYSPLIT BACK-TRAJECTORY MODEL SEPTEMBER 12, 2016**

Fig 2-21: A 6-hour back-trajectory ending at Brawley (blue icon) and Westmorland (red icon) at 1200 PST on September 12, 2016. This was the hour both stations were reporting elevated concentrations. Red trajectory indicates airflow at 10 meters AGL (above ground level); blue indicates airflow at 100 m; green indicates airflow at 500m. Yellow line indicates the international border. Aqua lines denote county boundaries. Dynamically generated through NOAA's Air Resources Laboratory HYSPLIT model. Base map from Google Earth

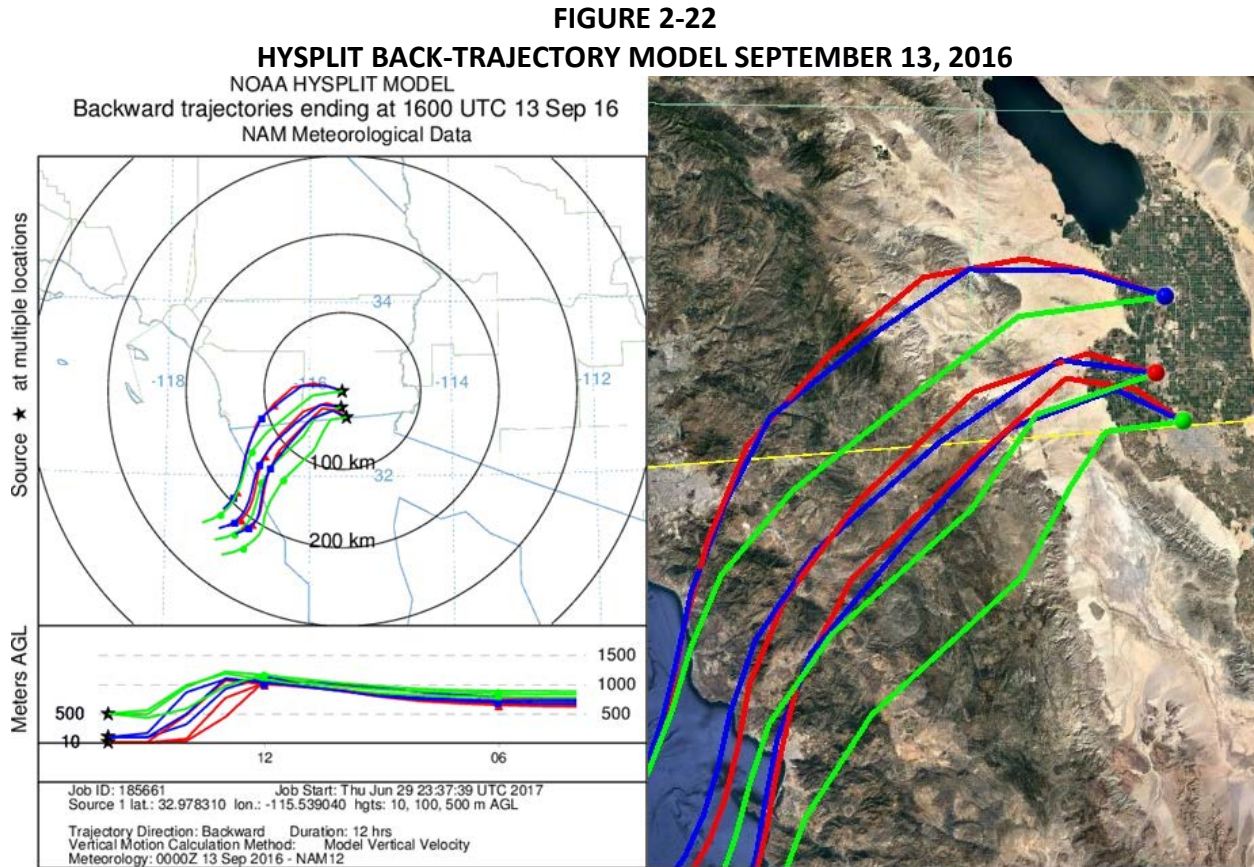


Fig 2-22: A 12-hour back-trajectory ending at Brawley, El Centro and Calexico at 0800 PST on September 13, 2016. Red trajectory indicates airflow at 10 meters AGL (above ground level); blue indicates airflow at 100 m; green indicates airflow at 500m. Yellow line indicates the international border. Aqua lines denote county boundaries. Dynamically generated through NOAA's Air Resources Laboratory HYSPLIT model. Base map from Google Earth

Figures 2-23 and 2-24 illustrate the elevated wind speeds and elevated levels of hourly PM_{10} concentrations measured in Riverside, Imperial and Yuma counties September 11, 2016 through September 14, 2016. Elevated emissions were entrained into Imperial County affecting the Brawley, Calexico, El Centro, and Westmorland monitors when gusty westerly winds associated with a strong low-pressure moved through the region. The Brawley, Calexico, El Centro, and Westmorland monitors measured the highest elevated concentrations on September 12, 2016 and September 13, 2016 coincident with measured wind speeds and gusts above 25mph.

The resulting entrained dust and accompanying high winds from the system qualify this event as a "high wind dust event".⁸ High wind dust events are considered natural events where the windblown dust is either from solely a natural source or from areas where anthropogenic sources of windblown dust are controlled with Best Available Control Measures (BACM). The following

⁸ Title 40 Code of Federal Regulations part 50: §50.1(p) High wind dust event is an event that includes the high-speed wind and the dust that the wind entrains and transports to a monitoring site.

sections provide evidence that the September 12, 2016 and September 13, 2016 high wind event qualifies as a natural event and that BACM was overwhelmed by the suddenness and intensity of the meteorological event.

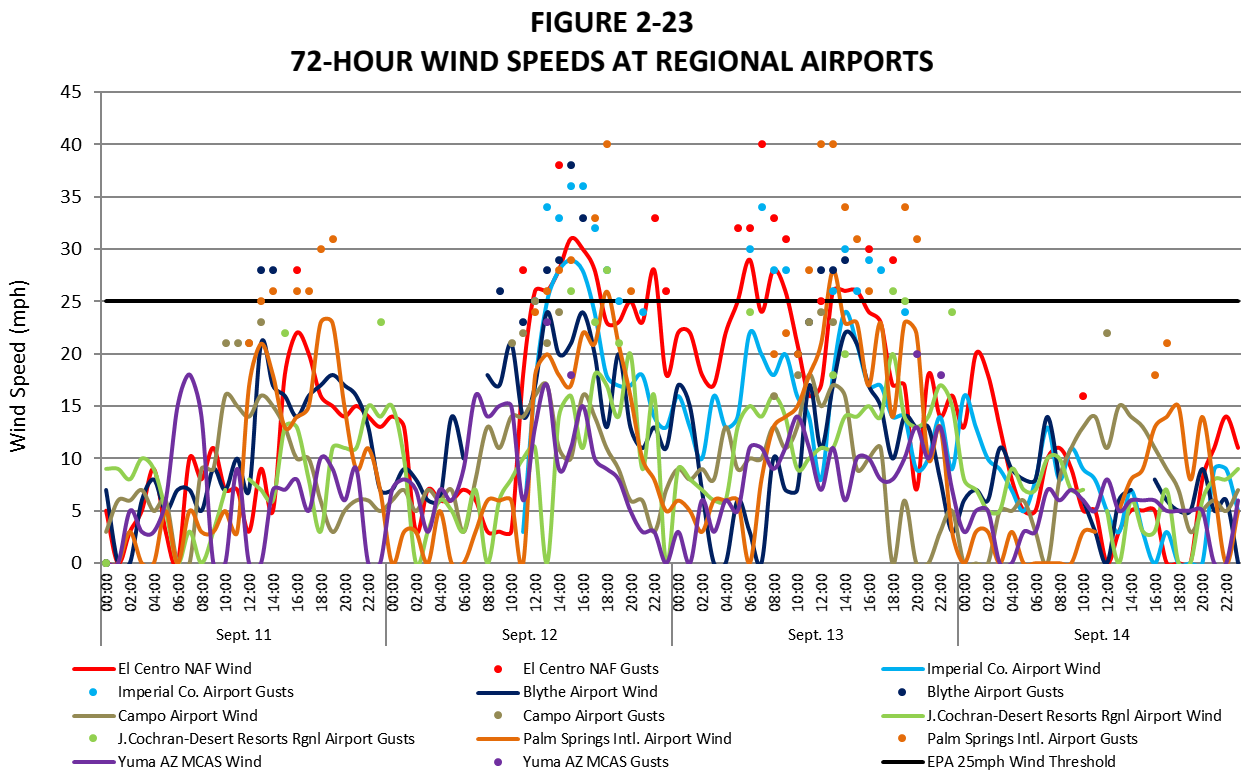


Fig 2-23: Is the graphical representation of the 72-hour measured winds speeds and gusts at regional airports in southeast California and southwestern Arizona. The graph illustrates the significant number of hours where measured wind speeds and wind gusts were above 25 mph and provides some indication of the regional nature of the event. Wind Data from the NCEI's QCLCD system

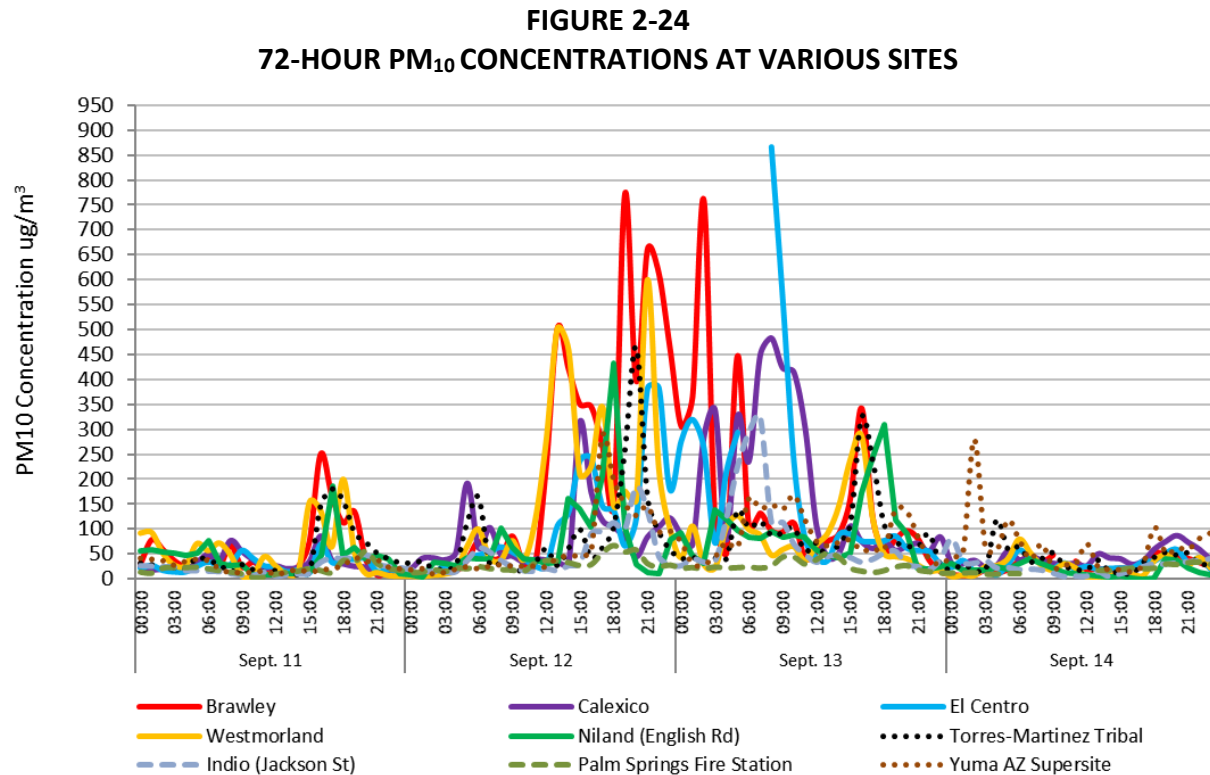


Fig. 2-24: Is the graphical representation of the 72-hour relative PM₁₀ concentrations at various sites in southeast California and southwestern Arizona. The elevated PM₁₀ concentrations at all sites on September 12, 2016 and September 13, 2016 demonstrate the regional impact of the weather system and accompanying winds. Air quality data from the EPA's AQS data bank

III Historical Concentrations

III.1 Analysis

While naturally occurring high wind events may recur seasonally and at times frequently and qualify for exclusion under the EER, historical comparisons of the particulate concentrations and associated winds provide insight into the frequency of events within an identified area. The following time series plots illustrate that PM₁₀ concentrations measured at the Brawley, Calexico, El Centro, and Westmorland monitors on September 12, 2016-13, 2016, were compared to non-event and event days demonstrating the variability over several years and seasons. The analysis, also, provides supporting evidence that there exists a clear causal relationship between the September 12, 2016-13, 2016 high wind event and the exceedance measured at the Brawley, Calexico, El Centro, and Westmorland monitors.

Figures 3-1 through 3-8 show the time series of available FRM and BAM 24-hr PM₁₀ concentrations at the Brawley, Calexico, El Centro, and Westmorland stations for the period of January 1, 2010 through September 13, 2016, 2016. Note that prior to 2013, the BAM data was not considered FEM and was not reported into AQS.⁹ In order to properly establish the variability of the event as it occurred on September 12, 2016 and September 13, 2016, 2016, 24-hour averaged PM₁₀ concentrations between January 1, 2010 and September 13, 2016, 2016 were compiled and plotted as a time series. All figures illustrate that the exceedance, which occurred on September 13, 2016, 2016 were outside the normal historical concentrations when compared to event and non-event days. Air quality data for all graphs was obtained through the EPA's AQS data bank.

⁹ Pollutant concentration data contained in EPA's Air Quality System (AQS) are required to be reported in units corrected to standard temperature and pressure (25 C, 760 mm Hg). Because the PM₁₀ concentrations prior to 2013 were not reported into the AQS database all BAM (FEM) data prior to 2013 within this report are expressed as micrograms per cubic meter (mg/m³) at local temperature and pressure (LTP) as opposed to standard temperature and pressure (STP, 760 torr and 25 C). The difference in concentration measurements between standard conditions and local conditions is insignificant and does not alter or cause any significant changes in conclusions to comparisons of PM₁₀ concentrations to PM₁₀ concentrations with in this demonstration.

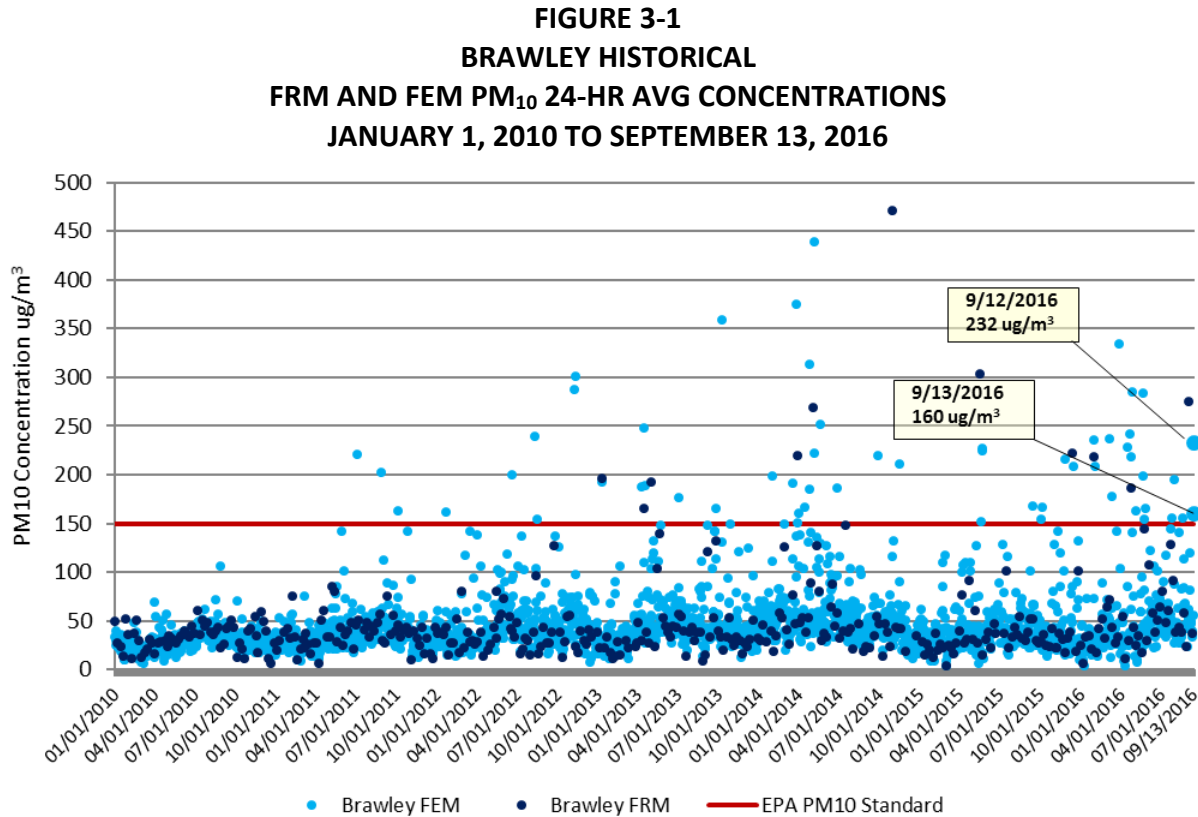


Fig 3-1: A comparison of PM₁₀ historical concentrations demonstrates that the measured concentration of 232 $\mu\text{g}/\text{m}^3$ on September 12, 2016 and 160 $\mu\text{g}/\text{m}^3$ on September 13, 2016 by the Brawley monitor was outside the normal historical concentrations when compared to similar event days and non-event days

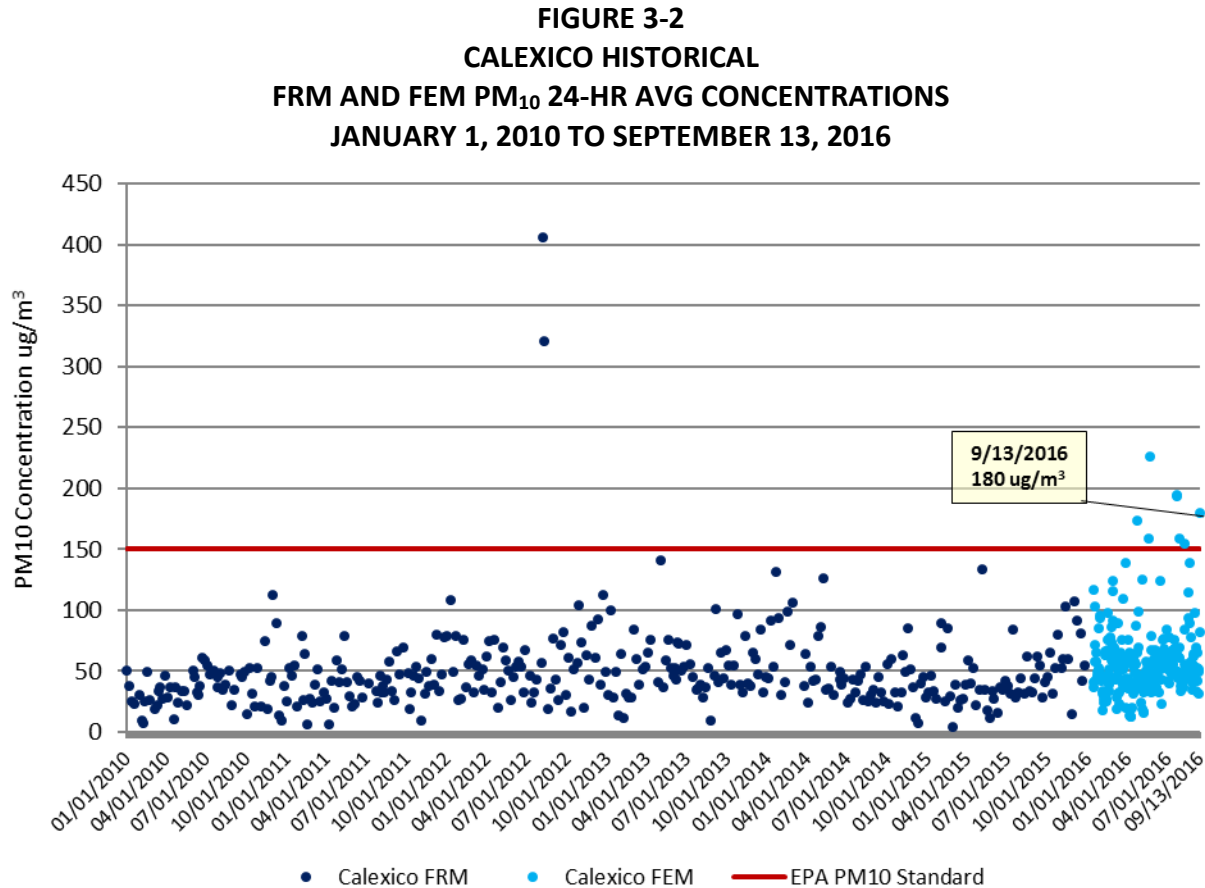


Fig 3-2: A comparison of PM₁₀ historical concentrations demonstrates that the measured concentration of 180 $\mu\text{g}/\text{m}^3$ on September 13, 2016 by the Callexico monitor was outside the normal historical concentrations when compared to similar event days and non-event days

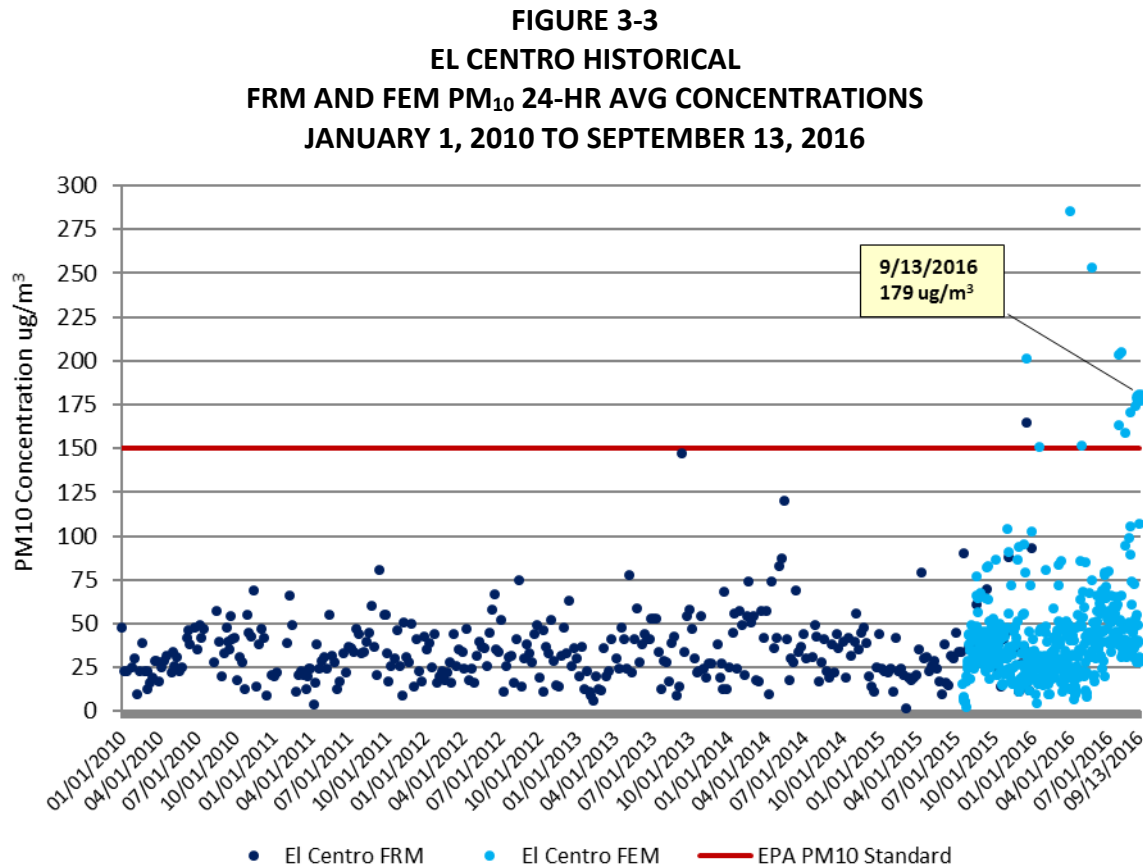


Fig 3-3: A comparison of PM₁₀ historical concentrations demonstrates that the measured concentration of 179 $\mu\text{g}/\text{m}^3$ on September 13, 2016 by the El Centro monitor was outside the normal historical concentrations when compared to similar event days and non-event days

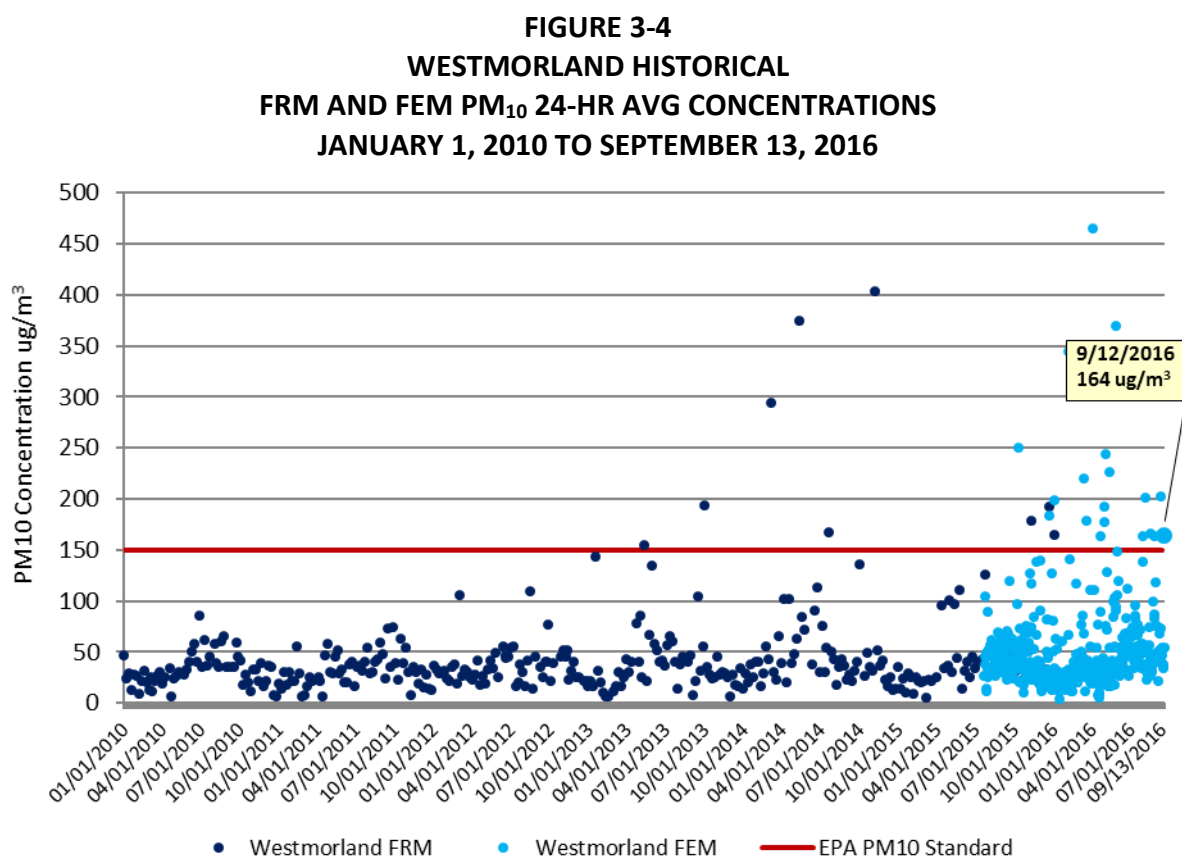
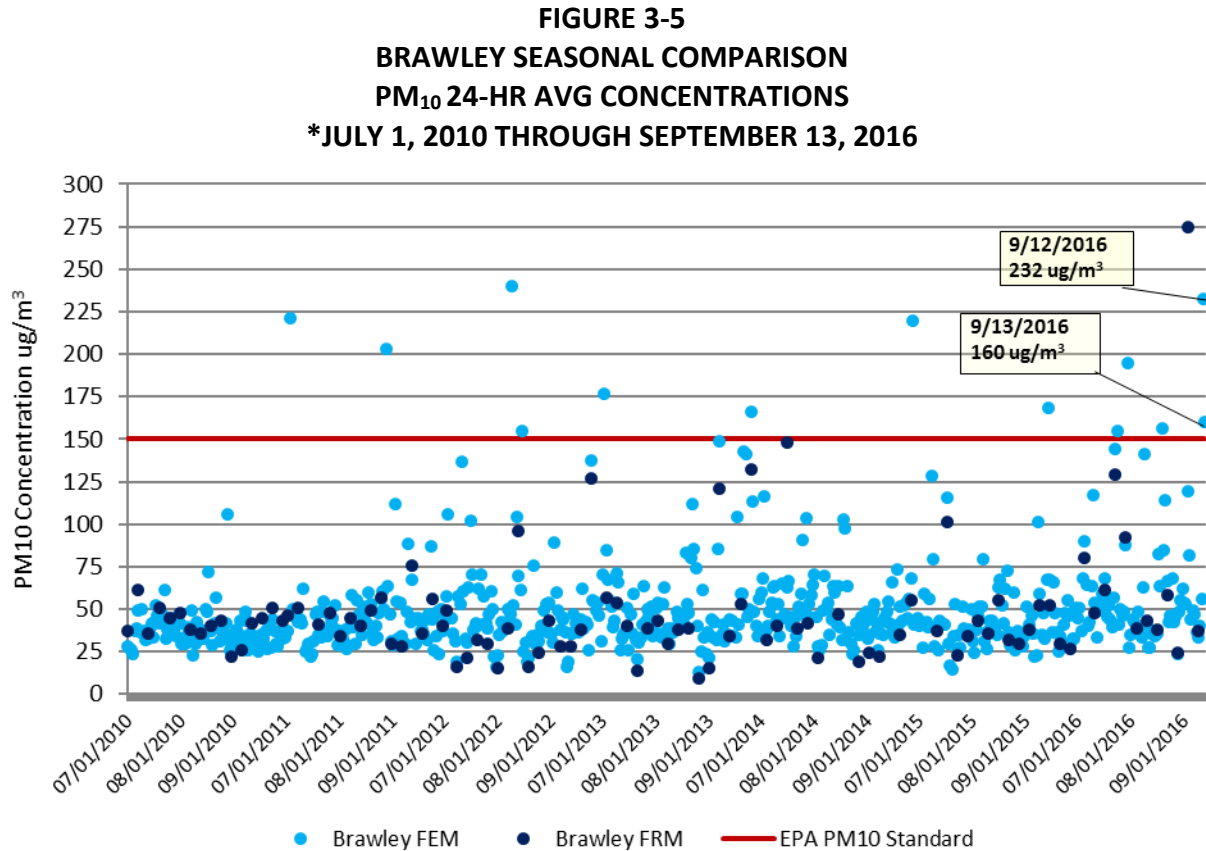


Fig 3-4: A comparison of PM₁₀ historical concentrations demonstrates that the measured concentrations of 164 $\mu\text{g}/\text{m}^3$ on September 12, 2016 by the Westmorland monitor was outside the normal historical concentrations when compared to similar event days and non-event days

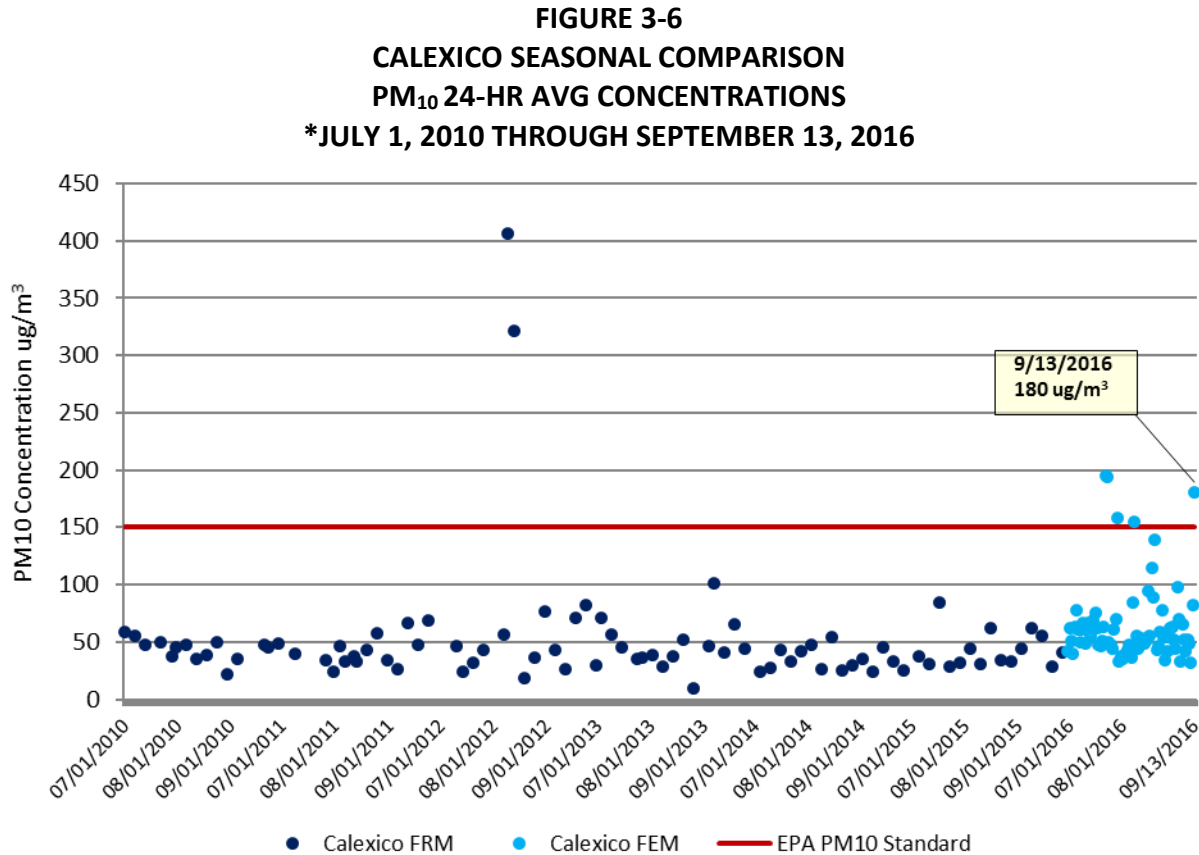
The time series, **Figures 3-1 through 3-4** for Brawley, Calexico, El Centro, and Westmorland included 2,448 sampling days (January 1, 2010 through September 13, 2016, 2016). During this period the Brawley station (**Figure 3-1**) measured 2,565 credible samples measured by either FRM or FEM monitors between January 1, 2010 and September 13, 2016, 2016.

Overall, the time series illustrates that of the 2,565 credible samples measured during there was a total of 57 exceedance days, which is a 2.2% occurrence rate. Calexico (**Figure 3-2**) measured 604 credible samples measured by either FRM or FEM monitors during this period (FEM sampling commenced in July 2015) during which the station measured 10 exceedance days. This translates into 1.7% of all samples. El Centro (**Figure 3-3**) measured 781 credible samples measured by either FRM or FEM monitors during this period (FEM sampling commenced in July 2015) during which the station measured 11 exceedance days. This translates into 1.4% of all samples. Westmorland (**Figure 3-4**) measured 782 credible samples measured by either FRM or FEM monitors during this period (FEM sampling began in July 2015) and measured 26 exceedance days. This equates to 3.3% of all samples. Clearly, exceedances by any of the monitoring stations over a historical period is a rare event.



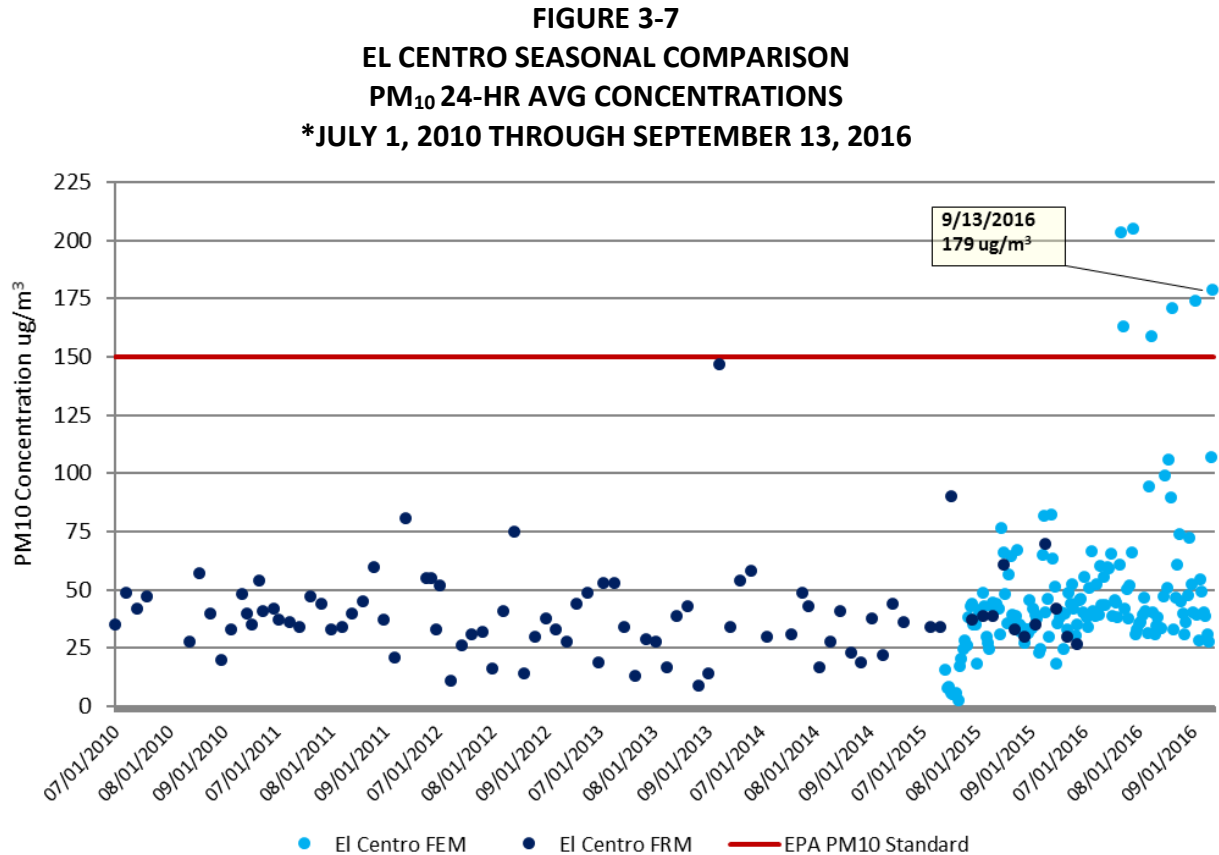
*July 1, 2010 to September 30, 2015 and July 1, 2016 to September 13, 2016

Fig 3-5: A comparison of PM₁₀ historical concentrations demonstrates that the measured concentration of 160 $\mu\text{g}/\text{m}^3$ on September 12, 2016 and 160 $\mu\text{g}/\text{m}^3$ on September 13, 2016 by the Brawley monitor was outside the normal historical concentrations when compared to similar event days and non-event days



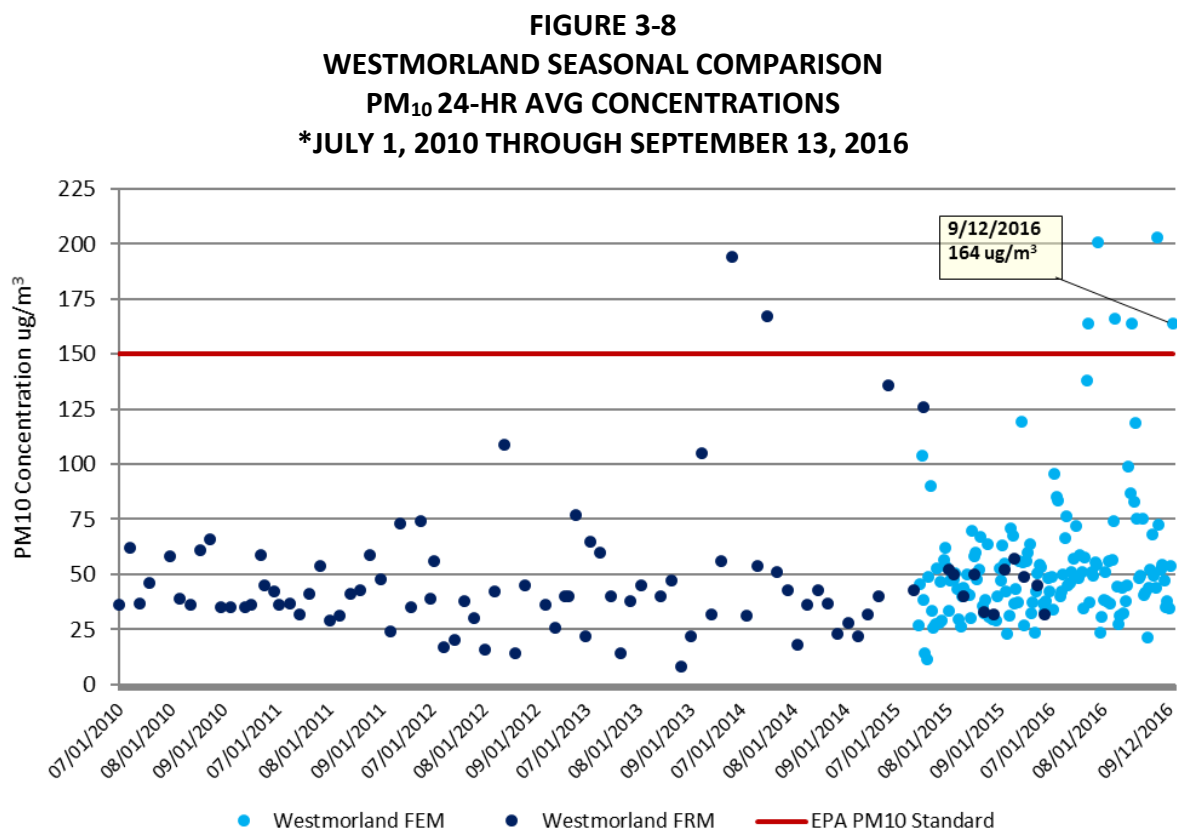
*July 1, 2010 to September 30, 2015 and July 1, 2016 to September 13, 2016

Fig 3-6: A comparison of PM₁₀ historical concentrations demonstrates that the measured concentration of 180 $\mu\text{g}/\text{m}^3$ on September 13, 2016 on by the Calexico monitor was outside the normal historical concentrations when compared to similar event days and non-event days



*July 1, 2010 to September 30, 2015 and July 1, 2016 to September 13, 2016

Fig 3-7: A comparison of PM₁₀ historical concentrations demonstrates that the measured concentration of 179 $\mu\text{g}/\text{m}^3$ on September 13, 2016 on by the El Centro BAM 1020 PM₁₀ monitor was outside the normal historical measurements. The far vast number of samples fall way below the exceedance threshold



*July 1, 2010 to September 30, 2015 and July 1, 2016 to September 13, 2016

Fig 3-8: A comparison of PM₁₀ historical concentrations demonstrates that the measured concentrations of 164 $\mu\text{g}/\text{m}^3$ on September 12, 2016, 2016 by the Westmorland BAM 1020 PM₁₀ monitor were outside the normal historical measurements. The far vast number of samples fall way below the exceedance threshold

Figures 3-5 through 3-8 display the seasonal fluctuations over 628 sampling days at the Brawley, Calexico, El Centro, and Westmorland stations for months July through September of years 2010 through 2016 (2016 ending September 13, 2016). The seasonal sampling period for Brawley (**Figure 3-5**) contains 727 combined FRM and FEM samples. Of these, 14 exceedances occurred during the third quarter which translates into 1.9% of all samples. The seasonal sampling period for Calexico (**Figure 3-6**)¹⁰ contains 164 credible samples and only seven exceedance days. This translates into 4.3% of all samples. The seasonal sampling period for El Centro (**Figure 3-6**)¹¹ contains 242 credible samples and only seven exceedance days. This translates into 2.9% of all samples. The seasonal sampling period for Westmorland station (**Figure 3-8**)¹² contains 242 credible samples and eight exceedance days, or 3.3% of all samples.

¹⁰ FEM sampling at the El Centro site began July 2015 therefore January is the only seasonal first-quarter data available.

¹¹ FEM sampling at the El Centro site began July 2015 therefore January is the only seasonal first-quarter data available.

¹² FEM sampling at the Westmorland site began July 2015 therefore January is the only seasonal first-quarter data available.

Figures 3-9 through 3-12 display percentile rankings for Brawley, Calexico, El Centro, and Westmorland over the historical period of January 1, 2010 through September 13, 2016.

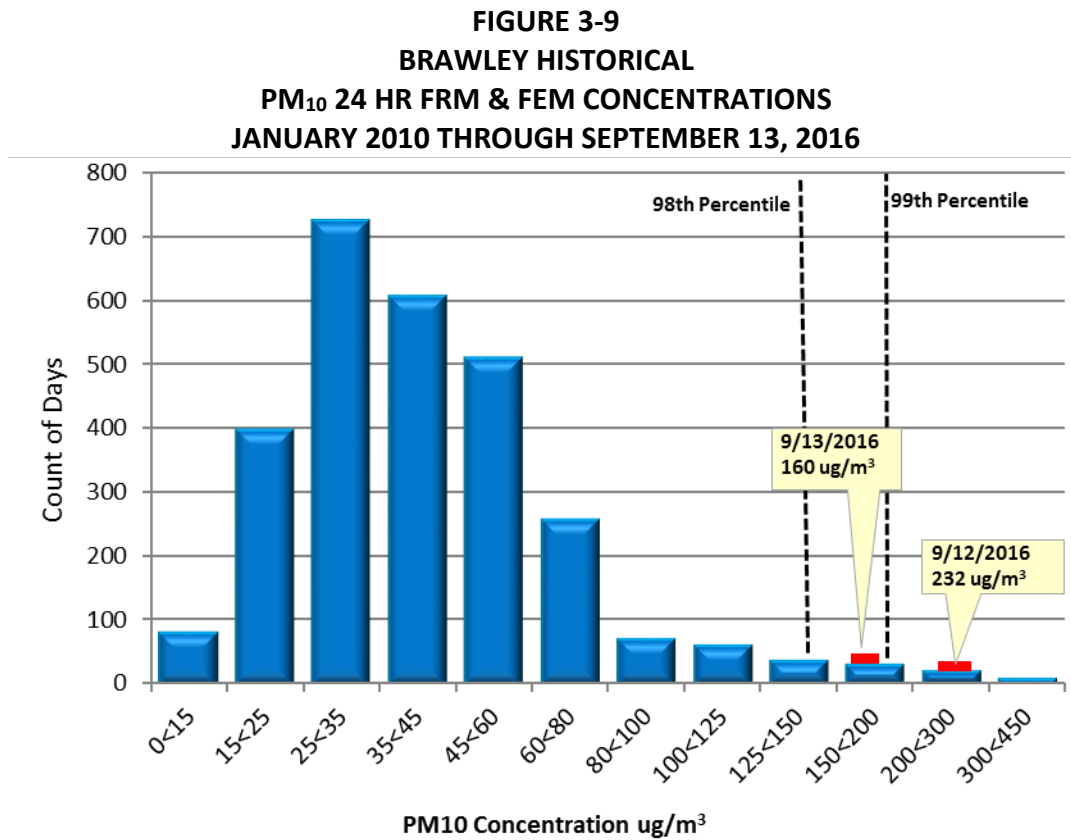


Fig 3-9: The 24-hr average PM₁₀ concentration at the Brawley monitoring site demonstrates that the concentration of 232 $\mu\text{g}/\text{m}^3$ on September 12, 2016 was in excess of the 99th percentile and that the concentration of 160 $\mu\text{g}/\text{m}^3$ on September 13, 2016 was in excess of the 98th percentile.

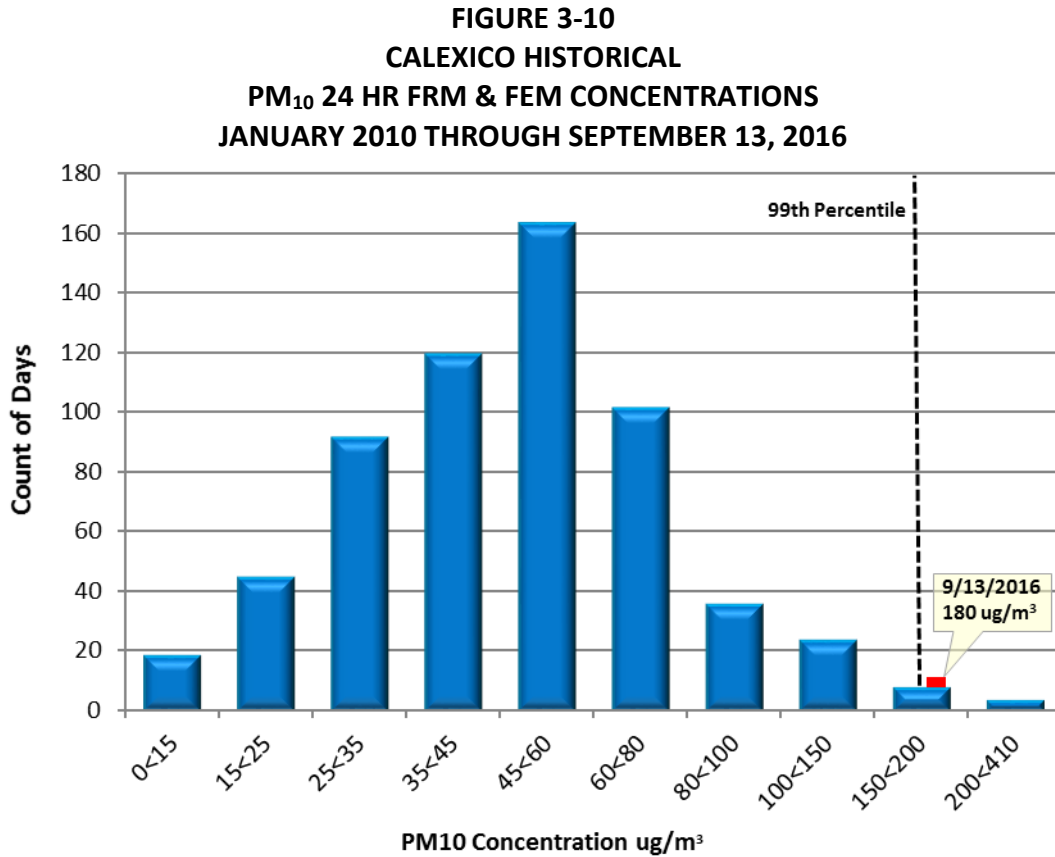


Fig 3-10: The 24-hr average PM₁₀ concentration at the Calexico monitoring site demonstrates that the concentration of 180 µg/m³ on September 13, 2016, 2016 was in excess of the 99th percentile.

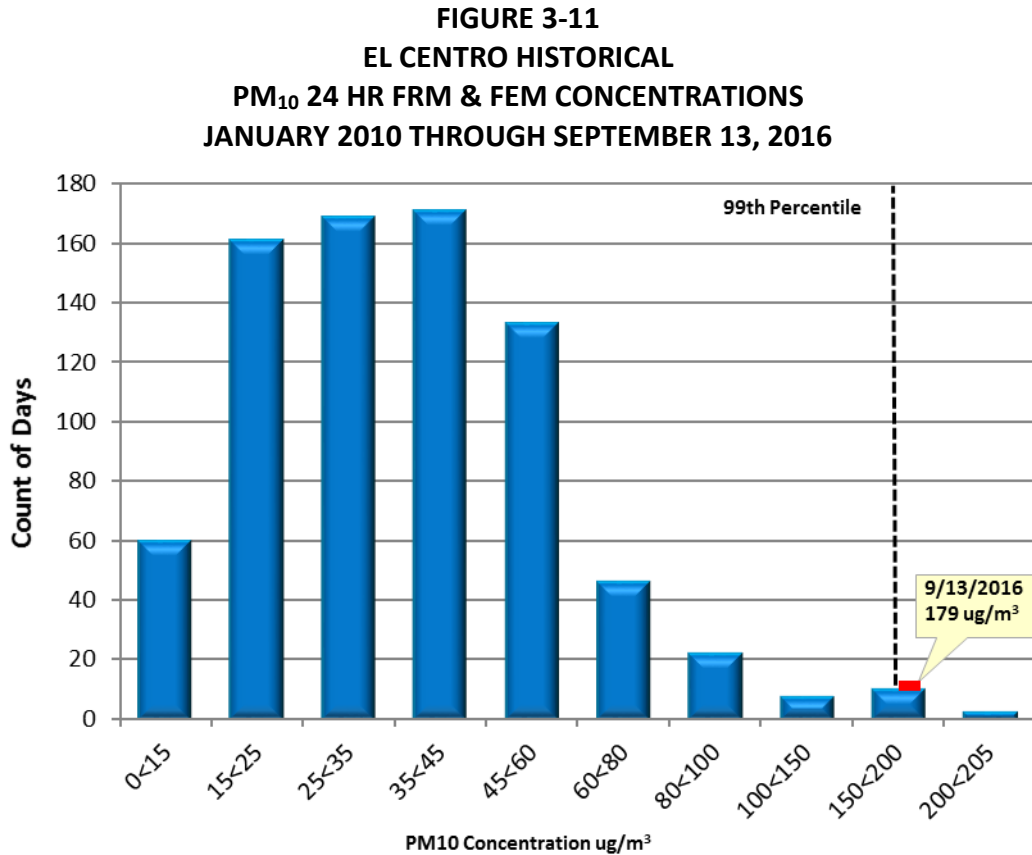


Fig 3-11: The 24-hr average PM₁₀ concentration at the El Centro monitoring site demonstrates that the concentration of 179 µg/m³ on September 13, 2016, 2016 was in excess of the 99th percentile

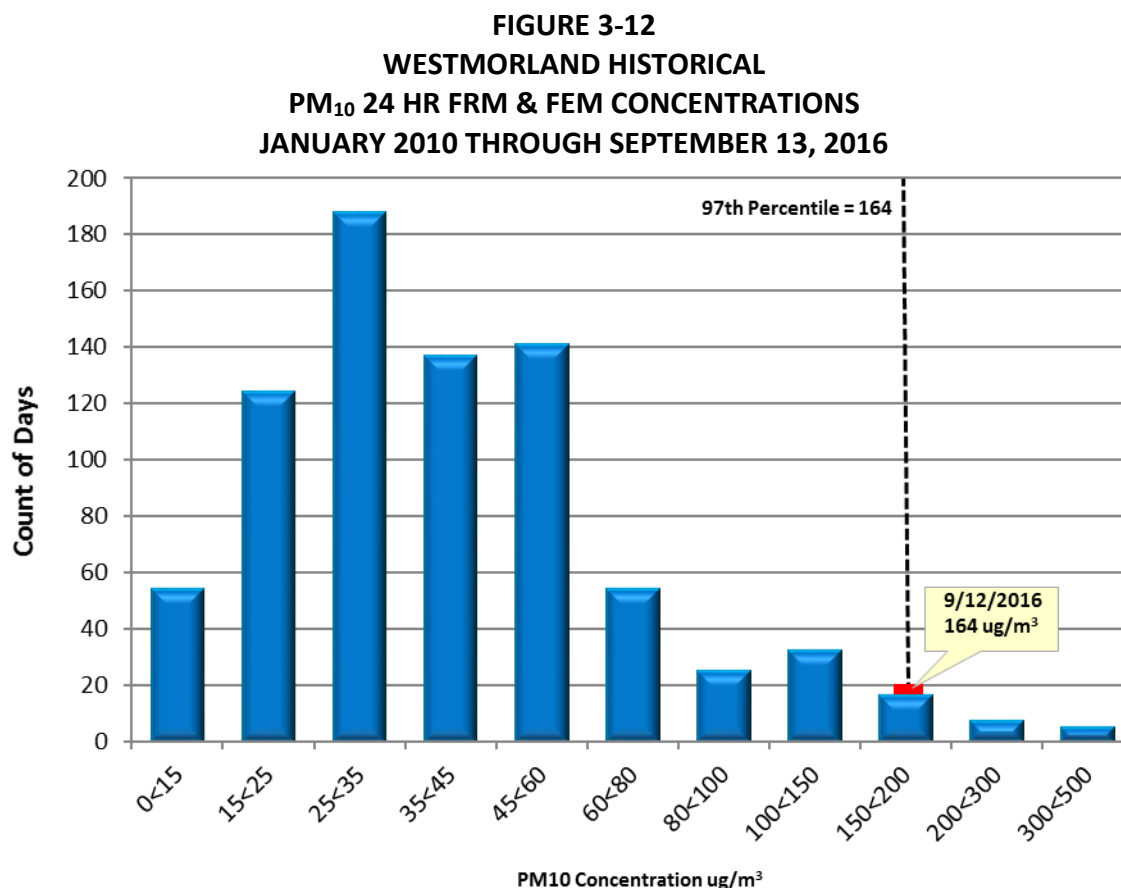


Fig 3-9: The 24-hr average PM₁₀ concentration at the Westmorland monitoring site demonstrates that the concentration of 164 µg/m³ on September 12, 2016, 2016 fell on the 97th percentile

For the combined FRM and FEM data sets the annual historical and the seasonal historical PM₁₀ concentrations of 232 µg/m³ at Brawley on September 12, 2016, 180 µg/m³ at Calexico, and 179 µg/m³ at El Centro on September 13, 2016, are all above the 99th percentile ranking. The concentration of 160 µg/m³ at Brawley on September 13, 2016 is above the 98th percentile, while the concentration of 164 µg/m³ at Westmorland on September 12, 2016 fell on the 97th percentile. Looking at the annual time series concentrations, the seasonal time series concentrations, and the percentile rankings for the historical patterns, the September 12, 2016 and September 13, 2016, 2016 measured exceedances are clearly outside the normal concentration levels when comparing to non-event days and event days.

III.2 Summary

The information provided, above, by the time series plots, seasonal time series plots, and the percentile rankings illustrate that the PM₁₀ concentration observed on September 12, 2016-13, 2016 occurs infrequently. When comparing the measured PM₁₀ levels on September 12, 2016-13, 2016 and following USEPA EER guidance, this demonstration provides supporting evidence that the measured exceedances measured at the Brawley, Calexico, El Centro, and Westmorland

monitoring sites were outside the normal historical and seasonal historical concentration levels.

The historical concentration analysis provided here supports the determination that the September 12, 2016-13, 2016 natural event affected the concentrations levels at the Brawley, Calexico, El Centro, and Westmorland monitors causing an exceedance. The concentration analysis further supports that the natural event affected air quality in such a way that there exists a clear causal relationship between the measured exceedances on September 12, 2016 and September 13, 2016 and the natural event, qualifying the natural event as an Exceptional Event.

IV Not Reasonably Controllable or Preventable

According to the October 3, 2016 promulgated revision to the Exceptional Event (EE) rule under 40 CFR §50.14(b)(8) air agencies must address the “not reasonably controllable or preventable” (nRCP) criterion as two prongs. In order to properly address the nRCP criterion the ICAPCD must not only identify the natural and anthropogenic sources of emissions causing and contributing to the monitored exceedance but must identify the relevant State Implementation Plan (SIP) measures and/or other enforceable control measures in place for the identified sources. An effective analysis of the nRCP must include the implementation status of the control measures in order to properly consider the measures as enforceable. USEPA considers control measures to be enforceable if approved into the SIP within 5 years of an EE demonstration submittal. The identified control measures must address those specific sources that are identified as causing or contributing to a monitored exceedance.

The final EE rule revision explains that an event is considered not reasonably controllable if reasonable measures to control the impact of the event on air quality were applied at the time of the event. Similarly, an event is considered not reasonably preventable if reasonable measures to prevent the event were applied at the time of the event. However, for “high wind events” when PM₁₀ concentrations are due to dust raised by high winds from desert areas whose sources are controlled with Best Available Control Measures (BACM) then the event is a “natural event” where human activity plays little or no direct causal role and thus is considered not preventable.

This section begins by providing background information on all SIP and other enforceable control measures in force during the EE for September 12, 2016 and September 13, 2016. In addition, this September 12, 2016 and September 13, 2016 demonstration provides technical and non-technical evidence that strong and gusty southerly winds blew across portions of the Sonoran Desert west of and into Imperial County suspending particulate matter affecting the Brawley, Calexico, El Centro, and Westmorland monitors on September 12, 2016 and September 13, 2016. This section identifies all natural and anthropogenic sources and provides regulatory evidence of the enforceability of the control measures in place during the September 12, 2016 and September 13, 2016 EE.

IV.1 Background

Inhalable particulate matter (PM₁₀) contributes to effects that are harmful to human health and the environment, including premature mortality, aggravation of respiratory and cardiovascular disease, decreased lung function, visibility impairment, and damage to vegetation and ecosystems. Upon enactment of the 1990 Clean Air Act (CAA) amendments, Imperial County was classified as moderate nonattainment for the PM₁₀ NAAQS under CAA sections 107(d)(4)(B) and 188(a). By November 15, 1991, such areas were required to develop and submit State Implementation Plan (SIP) revisions providing for, among other things, implementation of reasonably available control measures (RACM).

Partly to address the RACM requirement, ICAPCD adopted local Regulation VIII rules to control PM₁₀ from sources of fugitive dust on October 10, 1994, and revised them on November 25, 1996. USEPA did not act on these versions of the rules with respect to the federally enforceable SIP.

On August 11, 2004, USEPA reclassified Imperial County as a serious nonattainment area for PM₁₀. As a result, CAA section 189(b)(1)(B) required all BACM to be implemented in the area within four years of the effective date of the reclassification, i.e., by September 10, 2008.

On November 8, 2005, partly to address the BACM requirement, ICAPCD revised the Regulation VIII rules to strengthen fugitive dust requirements. On July 8, 2010, USEPA finalized a limited approval of the 2005 version of Regulation VIII, finding that the seven Regulation VIII rules largely fulfilled the relevant CAA requirements. Simultaneously, USEPA also finalized a limited disapproval of several of the rules, identifying specific deficiencies that needed to be addressed to fully demonstrate compliance with CAA requirements regarding BACM and enforceability.

In September 2010, ICAPCD and the California Department of Parks and Recreation (DPR) filed petitions with the Ninth Circuit Federal Court of Appeals for review of USEPA's limited disapproval of the rules. After hearing oral argument on February 15, 2012, the Ninth Circuit directed the parties to consider mediation before rendering a decision on the litigation. On July 27, 2012, ICAPCD, DPR and USEPA reached agreement on a resolution to the dispute which included a set of specific revisions to Regulation VIII. These revisions are reflected in the version of Regulation VIII adopted by ICAPCD on October 16, 2012 and approved by USEPA April 22, 2013. Since 2006 ICAPCD had implemented regulatory measures to control emissions from fugitive dust sources and open burning in Imperial County.

**FIGURE 4-1
REGULATION VIII GRAPHIC TIMELINE DEVELOPMENT**

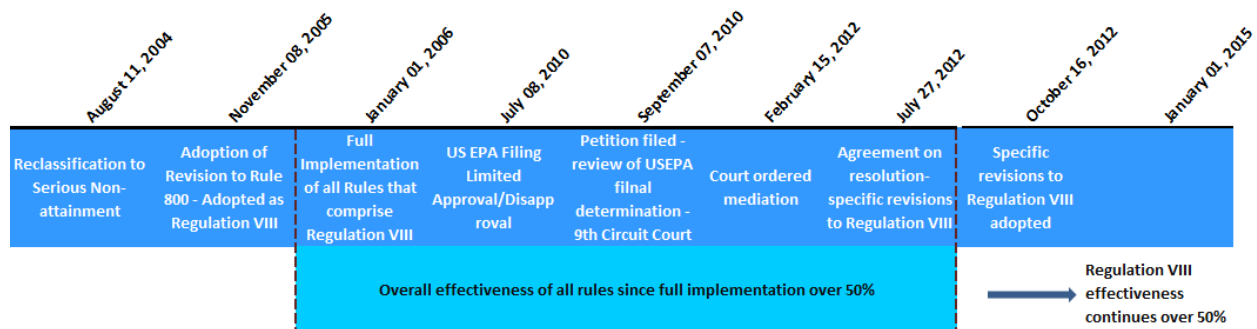


Fig 4-1: Regulation VIII Graphic Timeline

IV.1.a Control Measures

A brief summary of Regulation VIII which is comprised of seven fugitive dust rules is found below. **Appendix D** contains a complete set of the Regulation VIII rules.

ICAPCD's Regulation VIII consists of seven interrelated rules designed to limit emissions of PM₁₀ from anthropogenic fugitive dust sources in Imperial County.

Rule 800, General Requirements for Control of Fine Particulate Matter, provides definitions, a compliance schedule, exemptions and other requirements generally applicable to all seven rules. It requires the United States Bureau of Land Management (BLM), United States Border Patrol (BP) and DPR to submit dust control plans (DCP) to mitigate fugitive dust from areas and/or activities under their control. Appendices A and B within Rule 800 describe methods for determining compliance with opacity and surface stabilization requirements in Rules 801 through 806.

Rule 801, Construction and Earthmoving Activities, establishes a 20% opacity limit and control requirements for construction and earthmoving activities. Affected sources must submit a DCP and comply with other portions of Regulation VIII regarding bulk materials, carry-out and track-out, and paved and unpaved roads. The rule exempts single family homes and waives the 20% opacity limit in winds over 25 mph under certain conditions.

Rule 802, Bulk Materials, establishes a 20% opacity limit and other requirements to control dust from bulk material handling, storage, transport and hauling.

Rule 803, Carry-Out and Track-Out, establishes requirements to prevent and clean-up mud and dirt transported onto paved roads from unpaved roads and areas.

Rule 804, Open Areas, establishes a 20% opacity limit and requires land owners to prevent vehicular trespass and stabilize disturbed soil on open areas larger than 0.5 acres in urban areas, and larger than three acres in rural areas. Agricultural operations are exempted.

Rule 805, Paved and Unpaved Roads, establishes a 20% opacity limit and control requirements for unpaved haul and access roads, canal roads and traffic areas that meet certain size or traffic thresholds. It also prohibits construction of new unpaved roads in certain circumstances. Single-family residences and agricultural operations are exempted.

Rule 806, Conservation Management Practices, requires agricultural operation sites greater than 40 acres to implement at least one conservation management practice (CMP) for each of several activities that often generates dust at agricultural operations. In addition, agricultural operation sites must prepare a CMP plan describing how they comply with Rule 806, and must make the CMP plan available to the ICAPCD upon request.

IV.1.b Additional Measures

Imperial County Natural Events Action Plan (NEAP)

On August 2005, the ICAPCD adopted a NEAP for the Imperial County, as was required under the former USEPA Natural Events Policy, to address PM₁₀ events by:

- Protecting public health;
- Educating the public about high wind events;
- Mitigating health impacts on the community during future events; and
- Identifying and implementing BACM measures for anthropogenic sources of windblown dust.

Smoke Management Plan (SMP) Summary

There are 35 Air Pollution Control Districts or Air Quality Management Districts in California which are required to implement a district-wide smoke management program. The regulatory basis for California's Smoke Management Program, codified under Title 17 of the California Code of Regulations is the "Smoke Management Guidelines for Agricultural and Prescribed Burning" (Guidelines). California's 1987 Guidelines were revised to improve interagency coordination, avoid smoke episodes, and provide continued public safety while providing adequate opportunity for necessary open burning. The revisions to the 1987 Guidelines were approved March 14, 2001. All air districts, with the exception of the San Joaquin Valley Air Pollution Control District (SJAPCD) were required to update their existing rules and Smoke Management Plans to conform to the most recent update to the Guidelines.

Section 80150 of Title 17 specifies the special requirements for open burning in agricultural operations, the growing of crops and the raising of fowl or animals. This section specifically requires the ICAPCD to have rules and regulations that require permits that contain requirements that minimize smoke impacts from agricultural burning.

On a daily basis, the ICAPCD reviews surface meteorological reports from various airport agencies, the NWS, State fire agencies and CARB to help determine whether the day is a burn day. Using a four quadrant map of Imperial County allowed burns are allocated in such a manner as to assure minimal to no smoke impacts safeguarding the public health. Finally, all permit holders are required to notice and advise members of the public of a potential burn. This noticing requirement is known as the Good Neighbor Policy. On September 12, 2016 and September 13, 2016, 2016 the ICAPCD declared a No Burn day (**Appendix A**). No complaints were filed for agricultural burning on September 12, 2016 or September 13, 2016, 2016.

IV.1.c Review of Source Permitted Inspections and Public Complaints

A query of the ICAPCD permit database was compiled and reviewed for active permitted sources throughout Imperial County and specifically around Brawley, Calexico, El Centro, and Westmorland during the September 12, 2016-13, 2016 PM₁₀ exceedances. Both permitted and non-permitted sources are required to comply with Regulation VIII requirements that address fugitive dust emissions. The identified permitted sources are Aggregate Products, Inc., US Gypsum Quarry, Imperial Aggregates (Val-Rock, Inc., and Granite Construction), US Gypsum Plaster City, Clean Harbors (Laidlaw Environmental Services), Bullfrog Farms (Dairy), Burrtec Waste Industries, Border Patrol Inspection station, Centinela State Prison, various

communications towers not listed and various agricultural operations. Non-permitted sources include the wind farm known as Ocotillo Express, and a solar facility known as CSolar IV West. Finally, the desert regions are under the jurisdiction of the Bureau of Land Management and the California Department of Parks (Including Anza Borrego State Park and Ocotillo Wells).

An evaluation of all inspection reports, air quality complaints, compliance reports, and other documentation indicate no evidence of unusual anthropogenic-based PM₁₀ emissions. September 12, 2016 and September 13, 2016 was officially designated as a No Burn day. No complaints were filed on September 12, 2016 and September 13, 2016 related either to agricultural or waste burning or dust.

FIGURE 4-2
PERMITTED SOURCES

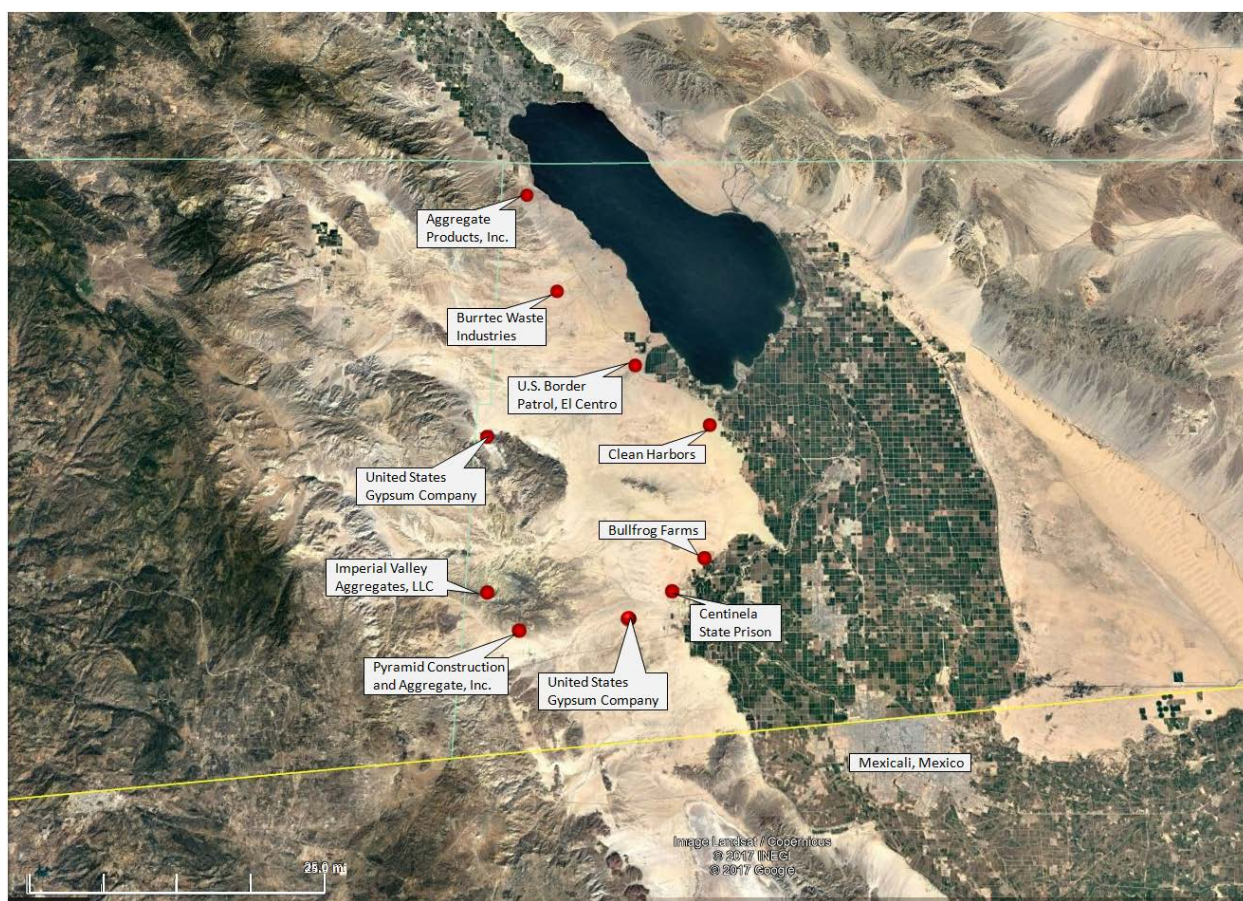


Fig 4-2: The above map identifies those permitted sources located west, northwest and southwest of the Brawley, Calexico, El Centro and Westmorland monitors. The green line to the north denotes the political division between Imperial and Riverside counties. The yellow line below denotes the international border between the United States and Mexico. The green checker-boarded areas are a mixed use of agricultural and community parcels. In addition, the desert areas are managed either by the Bureau of Land Management or the California Department of Parks. Base map from Google Earth

FIGURE 4-3
NON-PERMITTED SOURCES

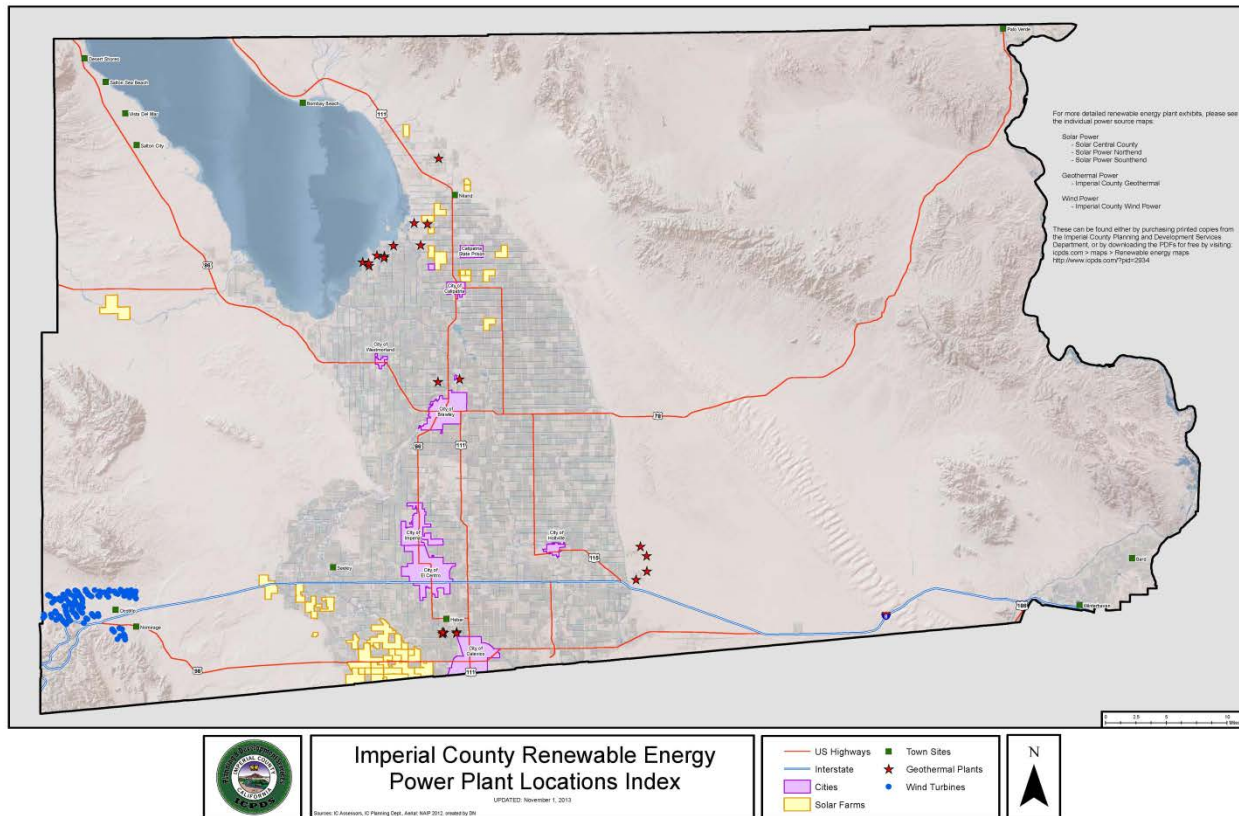


Fig 4-3: The above map identifies those power sources located west, northwest and southwest of the Brawley, Calexico, El Centro and Westmorland monitors. Blue indicate the Wind Turbines, Yellow are the solar farms and stars are geothermal plants.

IV.2 Forecasts and Warnings

As early as 8:03 pm PST on Friday, September 9, 2016 the San Diego NWS office issued a discussion forecasting stronger onshore flow with gusty southwest to west winds in the mountains and deserts of San Diego County resulting from a low-pressure system moving southward into California and Nevada. As September 12, 2016 approached, the San Diego NWS office issued its first out of seven Urgent Weather messages containing a wind advisory Monday, September 12, 2016 at 201am PST. The wind advisory expired Tuesday, September 13, 2016 at 7:22pm PST. The Urgent Weather messages forecasted gusty southwest to west winds 15 to 25mph with gusts 45 to 55mph and locally reduced visibility due to blowing dust and blowing sand. The Phoenix NWS office did not issue wind advisories however a Special Weather Statement was issued at 205pm Monday, September 12, 2016 confirming the reduced visibility in Imperial County. **Appendix A** contains copies of notices pertinent to the September 12, 2016 and September 13, 2016 event.

IV.3 Wind Observations

Wind data during the event were available from airports in eastern Riverside County, southeastern San Diego County, southwestern Yuma County (Arizona), northern Mexico, and Imperial County (**Table 2-2**). Data were also collected from automated meteorological instruments that were upstream from the Brawley, Calexico, El Centro, and Westmorland monitors during the wind event. On September 12, 2016 and September 13, 2016 Imperial County Airport (KIPL) and the El Centro NAF (KNJK) measured winds at or above 25 mph for multiple hours. Automated instruments at upstream locations at Mountain Springs Grade and Sunrise-Ocotillo also measured winds at or above 25 mph. Speeds of 25 mph are normally sufficient to overcome most PM₁₀ control measures. During the September 12, 2016 and September 13, 2016 event wind speeds were at or above the 25 mph threshold, overcoming the BACM in place.

IV.4 Summary

The weather and air quality forecasts and warnings outlined in this section demonstrate that high winds associated with the movement of a low-pressure system through the region transported windblown dust that caused uncontrollable PM₁₀ emissions. The BACM list as part of the control measures in Imperial County for fugitive dust emissions were in place at the time of the event. These control measures are required for areas designated as "serious" non-attainment for PM₁₀, such as Imperial County. Thus, the BACM in place at the time of the event were beyond reasonable. In addition, surface wind measurements at or upstream of Brawley, Calexico, El Centro, and Westmorland monitoring stations during the event were high enough (at or above 25 mph, with wind gusts of 40 mph) that BACM PM₁₀ control measures would have been overwhelmed.

Finally, a high wind dust event can be considered as a natural event, even when portions of the wind-driven emissions are anthropogenic, as long as those emissions have a clear causal relationship to the event and were determined to be not reasonably controllable or preventable. This demonstration has shown that the event that occurred on September 12, 2016 and September 13, 2016 was not reasonably controllable or preventable despite the strong and in force BACM within the affected areas in Imperial County. This demonstration has similarly established a clear causal relationship between the exceedances and the high wind event timeline and geographic location. The September 12, 2016 and September 13, 2016 event can be considered an exceptional event under the requirements of the exceptional event rule.

V Clear Causal Relationship

V.1 Discussion

Meteorological observations for September 12, 2016 and September 13, 2016, identified the strengthening of a low pressure moving southward into California and Nevada brought stronger onshore flow resulting in the tightening of gradients as early as the evening hours of September 11, 2016 through September 13, 2016. This strong onshore flow brought gusty southwest to west winds across the mountains and deserts of southeast California.

Entrained windblown dust from natural areas, particularly from the desert areas west of the Brawley, Calexico, El Centro, and Westmorland monitors, along with anthropogenic sources controlled with BACM, is confirmed by the meteorological and air quality observations on September 12, 2016 and September 13, 2016.

The strengthening of the onshore flow that caused a tightening of the pressure gradient caused the gusty southwest to west winds that affected air quality as evidenced by the seven Urgent Weather messages containing wind advisories¹³ issued for the San Diego County mountain ridge tops along desert mountain slopes into adjacent desert areas September 12, 2016 and September 13, 2016.

Figure 5-1 is a pair of Daily Weather Maps that show the surface low strengthening across California and Nevada at 0400 PST on September 12, 2016 and September 13, 2016.

¹³ A wind advisory is issued when the following conditions are met for one hour or longer: 1) sustained winds of 31 to 39 mph, and/or; 2) wind gusts of 46 to 57 mph for any duration. Source: NWS, 2016, <http://www.weather.gov/lwx/WarningsDefined#Wind> and a Blowing Dust Advisory is issued when blowing dust is expected to reduce visibility to between 1/4 and 1 mile, generally with winds of 25 mph or greater.

FIGURE 5-1
SURFACE LOW STRENGTHENS

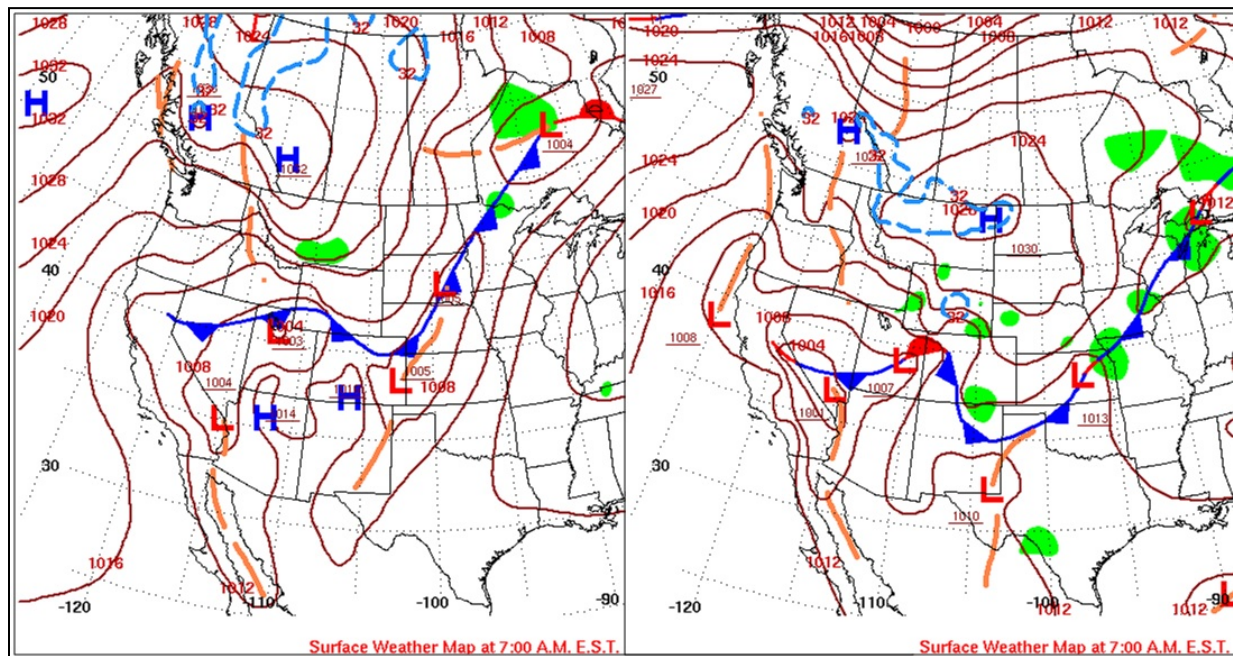


Fig 5-1: Two Daily Weather Maps (September 12, left, and September 13, right) illustrate the strengthening of the surface low across California and Nevada. Source: National Centers for Environmental Prediction, Weather Prediction Center WPC Surface Analysis Archive; http://www.wpc.ncep.noaa.gov/dailywxmap/index_20160912.html

FIGURE 5-2
SURFACE GRADIENT TIGHTENS

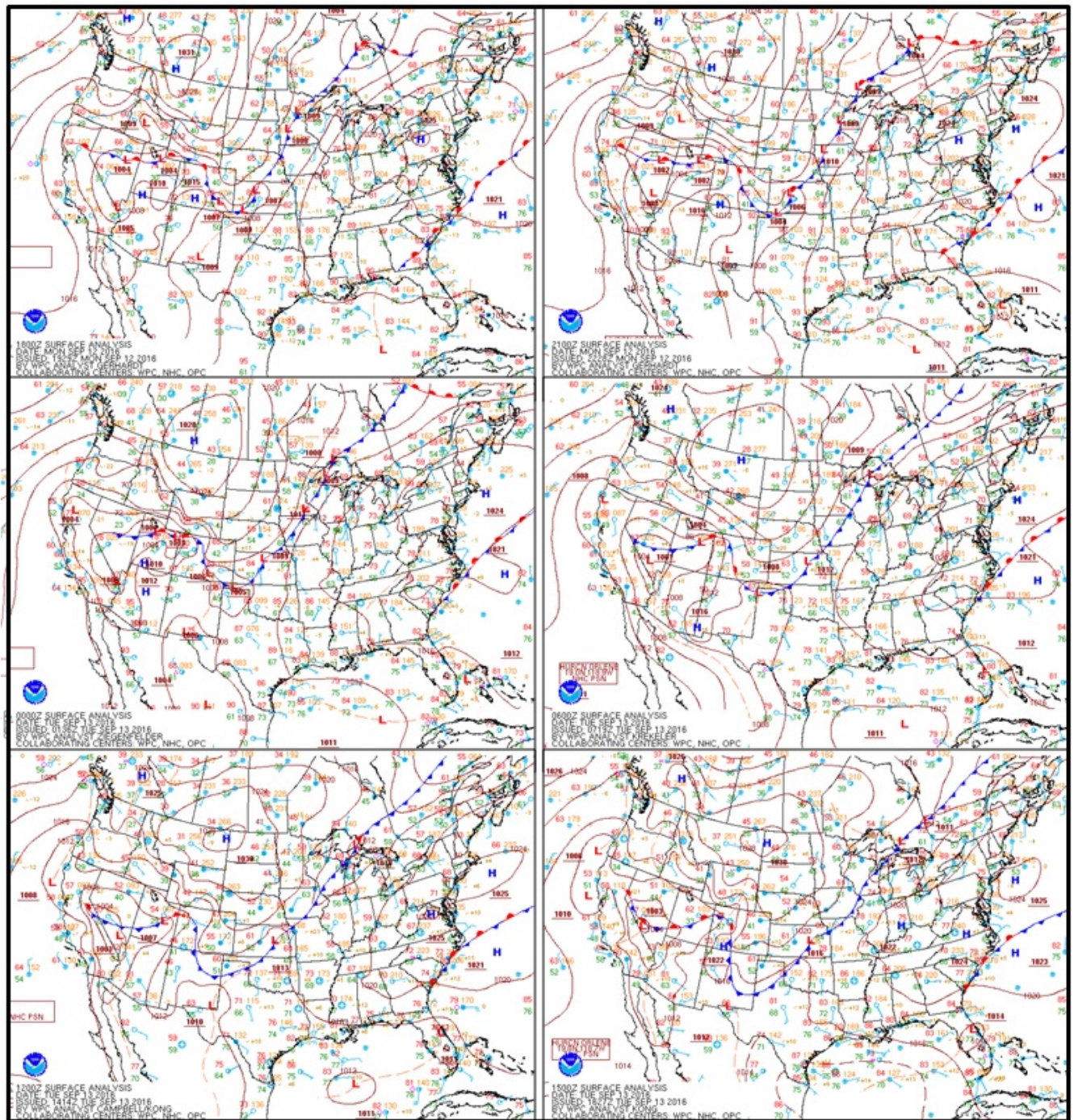


Fig 5-2: Six Surface Analysis Maps depict the surface gradient at 1000 PST (top left); 1300 PST (top right); 1600 PST (middle left); 2200 PST (middle right) September 12, 2016; at 0400 PST (bottom left) and 0700 PST (bottom right) September 13, 2016. The tightening of the gradient resulted in strong winds across southeast California. Source: WPC Surface Analysis Archive

Figures 5-3 and 5-4 are satellite images of aerosols over Imperial County. The MODIS instrument onboard the Aqua satellite captured the images on September 12, 2016 and September 13, 2016. These images show the aerosol optical depth¹⁴ over southeast California using the Deep Blue Angstrom exponent.¹⁵ These images help support that particulate matter was suspended over the area during the wind event.

FIGURE 5-3
AQUA MODIS CAPTURES LARGE-PARTICLE AEROSOLS OVER IMPERIAL COUNTY
SEPTEMBER 12, 2016

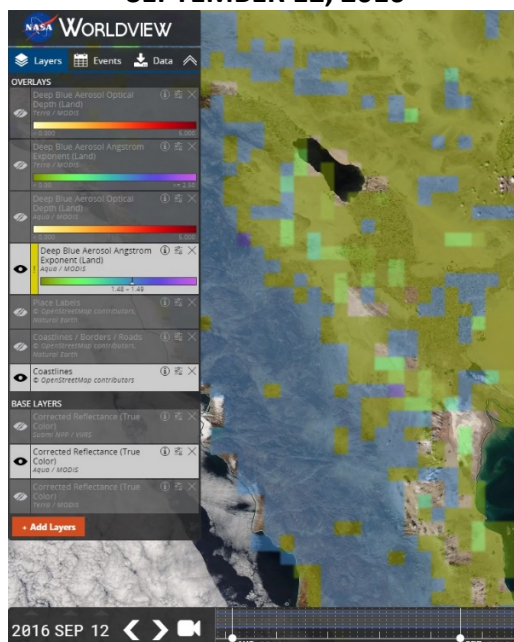


Fig 5-3: The MODIS instrument onboard the Aqua satellite captured a thick layer of large particle aerosols drifting over Imperial County at ~13:30 PST on September 12, 2016. Green colors (right image) indicate thicker aerosols that are more likely dust. Source: NASA Worldview; <https://worldview.earthdata.nasa.gov>

¹⁴ Aerosol Optical Depth (AOD) (or Aerosol Optical Thickness) indicates the level at which particles in the air (aerosols) prevent light from traveling through the atmosphere. Aerosols scatter and absorb incoming sunlight, which reduces visibility. From an observer on the ground, an AOD of less than 0.1 is “clean” - characteristic of clear blue sky, bright sun and maximum visibility. As AOD increases to 0.5, 1.0, and greater than 3.0, aerosols become so dense that sun is obscured. Sources of aerosols include pollution from factories, smoke from fires, dust from dust storms, sea salt, and volcanic ash and smog. Aerosols compromise human health when inhaled by people, particularly those with asthma or other respiratory illnesses. Aerosols also have an effect on the weather and climate by cooling or warming the earth, helping or preventing clouds from forming. Since aerosols are difficult to identify when they occur over different types of land surfaces and ocean surfaces, Worldview provides several different types of imagery layers to assist in the identification.

¹⁵ The MODIS Deep Blue Aerosol Ångström Exponent layer can be used to provide additional information related to the aerosol particle size over land. This layer is created from the Deep Blue (DB) algorithm, originally developed for retrieving over desert/arid land (bright in the visible wavelengths). The Ångström exponent provides additional information on the particle size (larger the exponent, the smaller the particle size). Values < 1 suggest optical dominance of coarse particles (e.g. dust) and values > 1 suggest optical dominance of fine particles (e.g. smoke).

FIGURE 5-4
AQUA MODIS CAPTURES LARGE-PARTICLE AEROSOLS OVER IMPERIAL COUNTY
SEPTEMBER 13, 2016

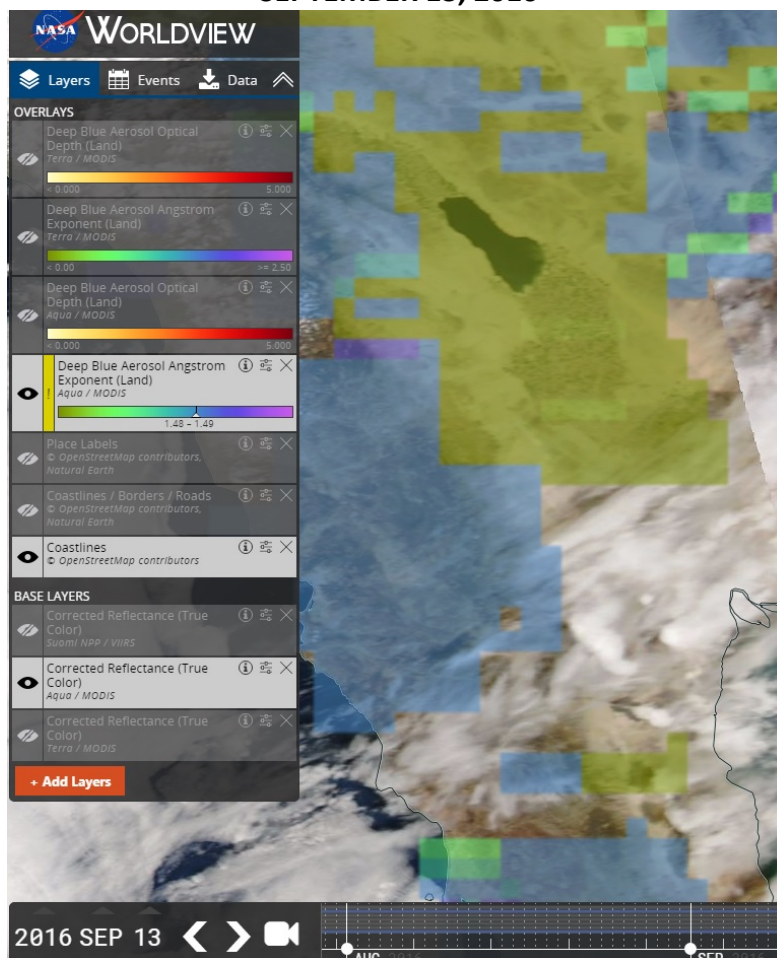


Fig 5-4: The MODIS instrument onboard the Aqua satellite captured a thick layer of large particle aerosols drifting over Imperial County at ~13:30 PST on September 3. Green colors (right image) indicate thicker aerosols that are more likely dust. Source: NASA Worldview; <https://worldview.earthdata.nasa.gov>

Entrained dust particles in the ambient air is also supported by two issued descriptive text narratives for smoke/dust observed and released by NOAA's Satellite Services for 9:15pm PST September 12, 2016 and 9:30pm PST September 13, 2016 (**Appendix A**). The first description identified a few areas of blowing dust from southern Arizona extending southwest into southern California. The second description identified an area of blowing sand/dust southwest of the Salton Sea fanning east. The descriptive text similarly identified blowing dust/sand in northeast and southeast San Bernardino County moving to the northeast and in Inyo County traveling south. This is coincident with elevated wind speeds, gusts and concentrations of PM₁₀ during the evening hours of September 12, 2016 and morning hours of September 13, 2016.

The EPA accepts a high wind threshold for sustained winds of 25 mph in California and 12 other states.¹⁶ **Tables 5-1 through 5-5** provide a temporal relationship of wind speeds, wind direction, wind gusts (if available), and PM₁₀ concentrations at the exceeding monitors on September 12, 2016 and September 13, 2016. The tables show that peak hourly concentrations took place immediately following or during the period of high upstream wind speeds.

TABLE 5-1
UPSTREAM WIND SPEEDS AND BRAWLEY PM₁₀ CONCENTRATIONS SEPTEMBER 12, 2016

Mountain Springs Grade (TNSC1)				Sunrise-Ocotillo (IMPSD)				El Centro NAF (KNJK)					Imperial Co. Airport (KIPL)				Brawley FEM	
HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	Obs.	HOUR	W/S	W/G	W/D	HOUR	PM ₁₀ (µg/m³)
0:50	16	24	215	0:00	7	12	268	0:56	14		270		0:53	M	M	M	0:00	14
1:50	17	24	211	1:00	7	10	285	1:56	13		270		1:53	M	M	M	1:00	10
2:50	20	27	213	2:00	9	12	294	2:56	3		VR		2:53	M	M	M	2:00	12
3:50	22	34	212	3:00	8	13	270	3:56	7		210		3:53	M	M	M	3:00	15
4:50	22	36	210	4:00	8	12	250	4:56	6		170		4:53	M	M	M	4:00	16
5:50	20	34	212	5:00	16	21	236	5:56	6		140		5:53	M	M	M	5:00	38
6:50	19	31	203	6:00	10	18	251	6:56	7		160		6:53	M	M	M	6:00	75
7:50	16	29	214	7:00	14	20	245	7:56	6		160		7:53	M	M	M	7:00	43
8:50	13	28	220	8:00	12	17	248	8:56	3		VR		8:53	M	M	M	8:00	44
9:50	19	31	245	9:00	12	23	236	9:56	3		VR		9:53	M	M	M	9:00	86
10:50	17	30	230	10:00	10	17	236	10:56	3		VR		10:53	M	M	M	10:00	30
11:50	18	34	241	11:00	20	28	229	11:56	18	28	260		11:53	3	M	VR	11:00	27
12:50	16	32	231	12:50	20	30	227	12:56	26		270		12:53	17	25	250	12:00	224
13:50	18	34	212	13:20	18	27	236	13:56	26		270		13:53	25	34	270	13:00	502
14:50	20	32	237	14:00	12	18	256	14:56	28	38	270		14:53	28	33	270	14:00	421
15:50	17	35	219	15:00	13	25	253	15:56	31		270		15:53	29	36	270	15:00	351
16:50	21	33	229	16:00	12	23	254	16:56	30		270		16:53	28	36	270	16:00	346
17:50	25	37	220	17:00	11	18	253	17:56	28		280		17:53	24	32	270	17:00	267
18:50	30	46	208	18:00	5	10	270	18:56	23		270		18:53	18	28	270	18:00	149
19:50	29	46	207	19:00	14	23	222	19:56	23		280		19:53	17	25	270	19:00	773
20:50	29	41	207	20:00	23	30	243	20:56	25		260		20:53	17		270	20:00	397
21:50	29	42	204	21:00	21	32	245	21:56	23		260		21:53	18	24	260	21:00	661
22:50	29	43	208	22:00	16	25	243	22:56	28	33	250		22:53	14		260	22:00	614
23:50	31	44	207	23:00	15	21	245	23:56	18	26	240		23:53	13		280	23:00	463

*Wind data for KNJK and KIPL from the NCEI's QCLCD system. Wind data for Mountain Springs Grade (TNSC1) and Fish Creek Mountains (FHCC1) from the University of Utah's MesoWest system. Brawley station does not measure wind data. Wind speeds = mph; Direction = degrees

¹⁶ "Treatment of Data Influenced by Exceptional Events; Final Guidance", FR Vol. 81, No. 191, 68279, October 3, 2016

TABLE 5-2

UPSTREAM WIND SPEEDS & WESTMORLAND PM₁₀ CONCENTRATIONS SEPTEMBER 12, 2016

Mountain Springs Grade (TNSC1)				Sunrise-Ocotillo (IMPSD)				El Centro NAF (KNJK)					Imperial Co. Airport (KIPL)				Westmorland FEM	
HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	Obs.	HOUR	W/S	W/G	W/D	HOUR	PM ₁₀ (µg/m ³)
0:50	16	24	215	0:00	7	12	268	0:56	14		270		0:53	M	M	M	0:00	6
1:50	17	24	211	1:00	7	10	285	1:56	13		270		1:53	M	M	M	1:00	5
2:50	20	27	213	2:00	9	12	294	2:56	3		VR		2:53	M	M	M	2:00	8
3:50	22	34	212	3:00	8	13	270	3:56	7		210		3:53	M	M	M	3:00	10
4:50	22	36	210	4:00	8	12	250	4:56	6		170		4:53	M	M	M	4:00	20
5:50	20	34	212	5:00	16	21	236	5:56	6		140		5:53	M	M	M	5:00	66
6:50	19	31	203	6:00	10	18	251	6:56	7		160		6:53	M	M	M	6:00	100
7:50	16	29	214	7:00	14	20	245	7:56	6		160		7:53	M	M	M	7:00	41
8:50	13	28	220	8:00	12	17	248	8:56	3		VR		8:53	M	M	M	8:00	38
9:50	19	31	245	9:00	12	23	236	9:56	3		VR		9:53	M	M	M	9:00	77
10:50	17	30	230	10:00	10	17	236	10:56	3		VR		10:53	M	M	M	10:00	38
11:50	18	34	241	11:00	20	28	229	11:56	18	28	260		11:53	3	M	VR	11:00	113
12:50	16	32	231	12:50	20	30	227	12:56	26		270		12:53	17	25	250	12:00	275
13:50	18	34	212	13:20	18	27	236	13:56	26		270		13:53	25	34	270	13:00	501
14:50	20	32	237	14:00	12	18	256	14:56	28	38	270		14:53	28	33	270	14:00	458
15:50	17	35	219	15:00	13	25	253	15:56	31		270		15:53	29	36	270	15:00	209
16:50	21	33	229	16:00	12	23	254	16:56	30		270		16:53	28	36	270	16:00	225
17:50	25	37	220	17:00	11	18	253	17:56	28		280		17:53	24	32	270	17:00	345
18:50	30	46	208	18:00	5	10	270	18:56	23		270		18:53	18	28	270	18:00	147
19:50	29	46	207	19:00	14	23	222	19:56	23		280		19:53	17	25	270	19:00	176
20:50	29	41	207	20:00	23	30	243	20:56	25		260		20:53	17		270	20:00	158
21:50	29	42	204	21:00	21	32	245	21:56	23		260		21:53	18	24	260	21:00	599
22:50	29	43	208	22:00	16	25	243	22:56	28	33	250		22:53	14		260	22:00	222
23:50	31	44	207	23:00	15	21	245	23:56	18	26	240		23:53	13		280	23:00	100

*Wind data for KNJK and KIPL from the NCEI's QCLCD system. Wind data for Mountain Springs Grade (TNSC1) and Sunrise-Ocotillo (IMPSD) from the University of Utah's MesoWest system. Wind speeds = mph; Direction = degrees

TABLE 5-3
UPSTREAM WIND SPEEDS AND BRAWLEY PM₁₀ CONCENTRATIONS SEPTEMBER 13, 2016

Mountain Springs Grade (TNSC1)				Sunrise-Ocotillo (IMPSD)				El Centro NAF (KNJK)					Imperial Co. Airport (KIPL)				Brawley FEM	
HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	Obs.	HOUR	W/S	W/G	W/D	HOUR	PM ₁₀ (µg/m ³)
0:50	16	24	215	0:00	7	12	268	0:56	22		260		0:53	16		270	0:00	306
1:50	17	24	211	1:20	7	10	285	120	22		270		1:53	13		290	1:00	365
2:50	20	27	213	2:20	9	12	294	256	18		260		2:53	10		300	2:00	760
3:50	22	34	212	3:00	8	13	270	356	17		260		3:53	16		300	3:00	114
4:50	22	36	210	4:00	8	12	250	456	22		260	BLDU	4:53	13		300	4:00	52
5:50	20	34	212	5:10	16	21	236	556	25	32	280	BLDU	5:21	14		260	5:00	448
6:50	19	31	203	6:00	10	18	251	654	29	32	280	BLDU	6:03	22	30	270	6:00	104
7:50	16	29	214	7:00	14	20	245	756	24	40	280	BLDU	7:43	20	34	280	7:00	132
8:50	13	28	220	8:10	12	17	248	821	28	33	270	BLDU	8:53	18	28	270	8:00	97
9:50	19	31	245	9:30	12	23	236	956	26	31	280	BLDU	9:53	20	28	280	9:00	94
10:50	17	30	230	10:00	10	17	236	10:56	21		270		10:53	16		290	10:00	112
11:50	18	34	241	11:00	20	28	229	11:56	16		270		11:53	14		280	11:00	42
12:50	16	32	231	12:50	20	30	227	12:56	17	25	260		12:53	8		330	12:00	55
13:50	18	34	212	13:20	18	27	236	13:56	26		270		13:53	18	26	280	13:00	76
14:50	20	32	237	14:00	12	18	256	14:56	26		270		14:53	24	30	260	14:00	91
15:50	17	35	219	15:00	13	25	253	15:56	26		260		15:53	21	26	280	15:00	161
16:50	21	33	229	16:00	12	23	254	16:56	24	30	260		16:53	17	29	270	16:00	343
17:50	25	37	220	17:00	11	18	253	17:56	23		260		17:53	17	28	270	17:00	122
18:50	30	46	208	18:00	5	10	270	18:56	17	29	280		18:53	14		290	18:00	55
19:50	29	46	207	19:00	14	23	222	19:57	17		290		19:53	14	24	300	19:00	80
20:50	29	41	207	20:00	23	30	243	20:56	7		310		20:53	9		310	20:00	97
21:50	29	42	204	21:00	21	32	245	21:56	18		310		21:53	10		330	21:00	81
22:50	29	43	208	22:00	16	25	243	22:56	14		310		22:53	14		320	22:00	38
23:50	31	44	207	23:00	15	21	245	23:56	16		300		23:53	9		330	23:00	15

*Wind data for KNJK and KIPL from the NCEI's QCLCD system. Wind data for Mountain Springs Grade (TNSC1) and Fish Creek Mountains (FHCC1) from the University of Utah's MesoWest system. Wind speeds = mph; Direction = degrees

TABLE 5-4
UPSTREAM WIND SPEEDS AND CALEXICO PM₁₀ CONCENTRATIONS SEPTEMBER 13, 2016

Mountain Springs Grade (TNSC1)				Sunrise-Ocotillo (IMPSD)				El Centro NAF (KNJK)					Imperial Co. Airport (KIPL)				Calexico FEM	
HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	Obs.	HOUR	W/S	W/G	W/D	HOUR	PM ₁₀ (µg/m ³)
0:50	16	24	215	0:00	7	12	268	0:56	22		260		0:53	16		270	0:00	88
1:50	17	24	211	1:20	7	10	285	120	22		270		1:53	13		290	1:00	69
2:50	20	27	213	2:20	9	12	294	256	18		260		2:53	10		300	2:00	284
3:50	22	34	212	3:00	8	13	270	356	17		260		3:53	16		300	3:00	338
4:50	22	36	210	4:00	8	12	250	456	22		260	BLDU	4:53	13		300	4:00	78
5:50	20	34	212	5:10	16	21	236	556	25	32	280	BLDU	5:21	14		260	5:00	327
6:50	19	31	203	6:00	10	18	251	654	29	32	280	BLDU	6:03	22	30	270	6:00	236
7:50	16	29	214	7:00	14	20	245	756	24	40	280	BLDU	7:43	20	34	280	7:00	448
8:50	13	28	220	8:10	12	17	248	821	28	33	270	BLDU	8:53	18	28	270	8:00	483
9:50	19	31	245	9:30	12	23	236	956	26	31	280	BLDU	9:53	20	28	280	9:00	423
10:50	17	30	230	10:00	10	17	236	10:56	21		270		10:53	16		290	10:00	414
11:50	18	34	241	11:00	20	28	229	11:56	16		270		11:53	14		280	11:00	302
12:50	16	32	231	12:50	20	30	227	12:56	17	25	260		12:53	8		330	12:00	106
13:50	18	34	212	13:20	18	27	236	13:56	26		270		13:53	18	26	280	13:00	43
14:50	20	32	237	14:00	12	18	256	14:56	26		270		14:53	24	30	260	14:00	52
15:50	17	35	219	15:00	13	25	253	15:56	26		260		15:53	21	26	280	15:00	106
16:50	21	33	229	16:00	12	23	254	16:56	24	30	260		16:53	17	29	270	16:00	75
17:50	25	37	220	17:00	11	18	253	17:56	23		260		17:53	17	28	270	17:00	61
18:50	30	46	208	18:00	5	10	270	18:56	17	29	280		18:53	14		290	18:00	76
19:50	29	46	207	19:00	14	23	222	19:57	17		290		19:53	14	24	300	19:00	57
20:50	29	41	207	20:00	23	30	243	20:56	7		310		20:53	9		310	20:00	65
21:50	29	42	204	21:00	21	32	245	21:56	18		310		21:53	10		330	21:00	71
22:50	29	43	208	22:00	16	25	243	22:56	14		310		22:53	14		320	22:00	55
23:50	31	44	207	23:00	15	21	245	23:56	16		300		23:53	9		330	23:00	84

*Wind data for KNJK and KIPL from the NCEI's QCLCD system. Wind data for Mountain Springs Grade (TNSC1) and Fish Creek Mountains (FHCC1) from the University of Utah's MesoWest system. Wind speeds = mph; Direction = degrees

TABLE 5-5
UPSTREAM WIND SPEEDS AND EL CENTRO PM₁₀ CONCENTRATIONS SEPTEMBER 13, 2016

Mountain Springs Grade (TNSC1)				Sunrise-Ocotillo (IMPSD)				El Centro NAF (KNJK)					Imperial Co. Airport (KIPL)				El Centro FEM	
HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	Obs.	HOUR	W/S	W/G	W/D	HOUR	PM ₁₀ (µg/m ³)
0:50	16	24	215	0:00	7	12	268	0:56	22		260		0:53	16		270	0:00	277
1:50	17	24	211	1:20	7	10	285	120	22		270		1:53	13		290	1:00	320
2:50	20	27	213	2:20	9	12	294	256	18		260		2:53	10		300	2:00	263
3:50	22	34	212	3:00	8	13	270	356	17		260		3:53	16		300	3:00	72
4:50	22	36	210	4:00	8	12	250	456	22		260	BLDU	4:53	13		300	4:00	215
5:50	20	34	212	5:10	16	21	236	556	25	32	280	BLDU	5:21	14		260	5:00	294
6:50	19	31	203	6:00	10	18	251	654	29	32	280	BLDU	6:03	22	30	270	6:00	
7:50	16	29	214	7:00	14	20	245	756	24	40	280	BLDU	7:43	20	34	280	7:00	
8:50	13	28	220	8:10	12	17	248	821	28	33	270	BLDU	8:53	18	28	270	8:00	867
9:50	19	31	245	9:30	12	23	236	956	26	31	280	BLDU	9:53	20	28	280	9:00	563
10:50	17	30	230	10:00	10	17	236	10:56	21		270		10:53	16		290	10:00	234
11:50	18	34	241	11:00	20	28	229	11:56	16		270		11:53	14		280	11:00	79
12:50	16	32	231	12:50	20	30	227	12:56	17	25	260		12:53	8		330	12:00	42
13:50	18	34	212	13:20	18	27	236	13:56	26		270		13:53	18	26	280	13:00	37
14:50	20	32	237	14:00	12	18	256	14:56	26		270		14:53	24	30	260	14:00	89
15:50	17	35	219	15:00	13	25	253	15:56	26		260		15:53	21	26	280	15:00	90
16:50	21	33	229	16:00	12	23	254	16:56	24	30	260		16:53	17	29	270	16:00	76
17:50	25	37	220	17:00	11	18	253	17:56	23		260		17:53	17	28	270	17:00	75
18:50	30	46	208	18:00	5	10	270	18:56	17	29	280		18:53	14		290	18:00	76
19:50	29	46	207	19:00	14	23	222	19:57	17		290		19:53	14	24	300	19:00	86
20:50	29	41	207	20:00	23	30	243	20:56	7		310		20:53	9		310	20:00	62
21:50	29	42	204	21:00	21	32	245	21:56	18		310		21:53	10		330	21:00	57
22:50	29	43	208	22:00	16	25	243	22:56	14		310		22:53	14		320	22:00	55
23:50	31	44	207	23:00	15	21	245	23:56	16		300		23:53	9		330	23:00	30

*Wind data for KNJK and KIPL from the NCEI's QCLCD system. Wind data for Mountain Springs Grade (TNSC1) and Fish Creek Mountains (FHCC1) from the University of Utah's MesoWest system. Wind speeds = mph; Direction = degrees

Figures 5-5 and 5-6 are graphical depictions that provide a general timeline of events by combining a six-hour and a 12-hour HYSPLIT back-trajectory with key upstream wind speeds and corresponding PM₁₀ concentrations in the hours leading up to and during the peak concentrations at the Brawley, El Centro, Calexico and Westmorland monitors on September 12, 2016 and September 13, 2016. The trajectory ends at 1200 PST on September 12, 2016 which is the hour when both the Brawley and Westmorland monitors measured elevated PM₁₀ concentrations above 200 µg/m³. On September 13, 2016 the trajectory ends at 0800 PST which is the hour when both the Calexico and El Centro monitors measured peak PM₁₀ concentrations. Brawley saw its peak concentrations at 0200 PST.

FIGURE 5-5
TIMELINE OF ENTRAINMENT SEPTEMBER 12, 2016

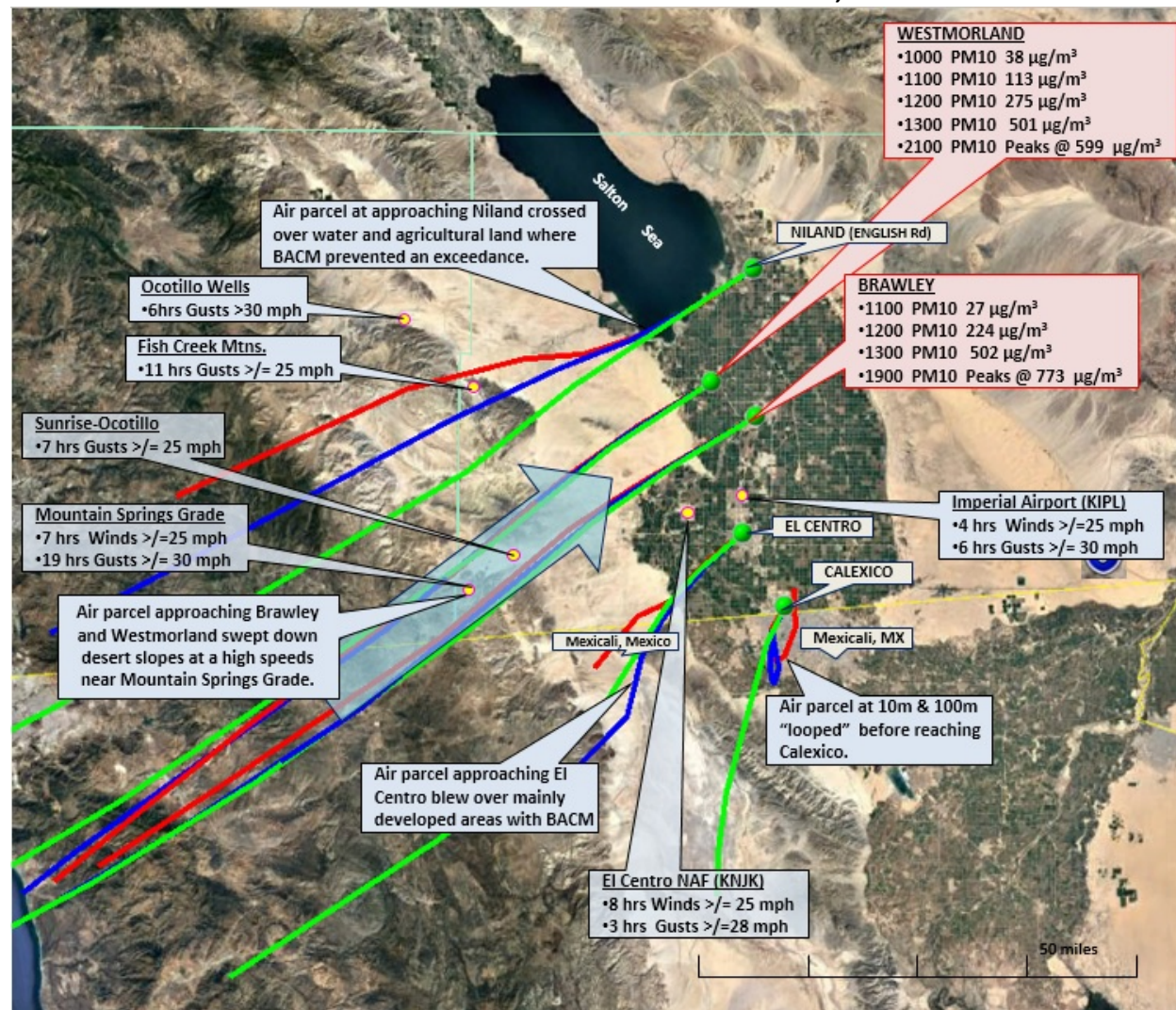


Fig 5-5: A six-hour HYSPLIT trajectory illustrates the path of airflow ending at all monitors at 1200 PST on September 12, 2016. Red trajectory indicates airflow at 10 meters AGL (above ground level); blue indicates airflow at 100 m; green indicates airflow at 500m. Yellow line indicates the international border. Aqua lines denote county boundaries. Dynamically generated through NOAA's Air Resources Laboratory HYSPLIT model. Base map from Google Earth

Both the Brawley and Westmorland monitors measured exceedances on September 12, 2016 while Niland, El Centro, and Calexico did not. Gusty southwest to west winds blew through the mountain and desert slopes at Mountain Springs over the adjacent desert floor and sparse agricultural lands before reaching Brawley and Westmorland. Both Calexico and El Centro had strikingly different airflows, during the same six-hour period. Although the El Centro monitor measured elevated concentrations the air up to the 10m and 100m heights approaching El Centro flowed over larger areas of developed lands with BACM. The trajectory of air approaching

Calexico was radically different. At the 10m and 100m heights an indication of variable winds over developed source areas in Mexicali Mexico looped into each other. Although the Niland monitor measured seven hours of elevated concentrations and the air flow approaching Niland was more direct than at Calexico, airflow over the waters of the Salton Sea reduced saltation and suspension before blowing over agricultural lands with BACM. In any event, winds continued to remain elevated through the morning hours of September 13, 2016. Gusty southwest to west winds within the mountains and desert slopes of San Diego county, such as at the Mountain Springs Grade continued to transport windblown dust into Imperial County.

FIGURE 5-6
TIMELINE OF ENTRAINMENT SEPTEMBER 13, 2016

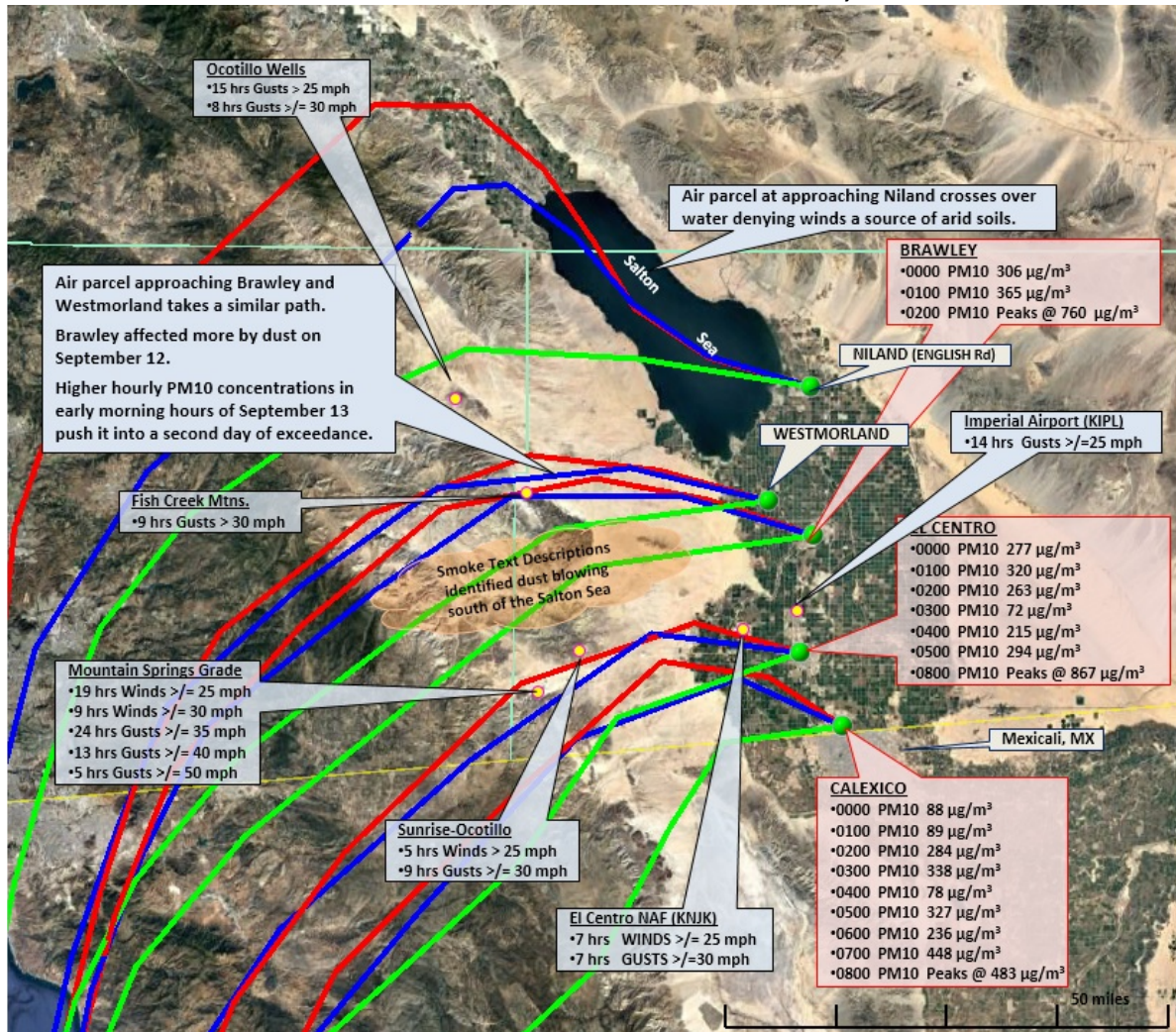


Fig 5-6: The 12-hour HYSPLIT trajectory illustrates the path of the airflow ending at 0800 PST on September 13, 2016. Red trajectory indicates air flow at 10 meters AGL (above ground level); blue indicates air flow at 100 m; green indicates air flow at 500m. Times given are for red trajectories at the three stations. Yellow line indicates the international border. Aqua lines denote county boundaries. Dynamically generated through NOAA's Air Resources Laboratory HYSPLIT model. Base map from Google Earth.

As mentioned above gusty southwest to west winds suspended windblown dust from the previous day through the early morning hours of September 13, 2016 causing exceedances at the Brawley, El Centro and Calexico monitors. Unlike the airflow towards Westmorland, the airflow towards Niland blew over a large expanse of the Salton Sea where saltation and suspension would be reduced before reaching the Niland monitor. The airflow towards Westmorland, like the airflow towards Brawley had a more westerly direction where topography played a greater role in the suspension of dust. Unlike the Brawley monitor, the Westmorland monitor is located within a residential area surrounded by homes and a greater amount of vegetation. The Brawley monitor is surrounded by a commercial urban setting as opposed to a residential setting. In any event, westerly winds during the morning hours of September 13, 2016 caused three hours of elevated concentrations at the Westmorland monitor while the Brawley monitor measured 8 hours of elevated concentrations.

Figures 5-7 through 5-10 depict PM₁₀ concentrations and wind speeds over a 96-hour period at Brawley, Calexico, El Centro, and Westmorland. Fluctuations in hourly concentrations at the monitors over 96 hours show a positive correlation with wind speeds and gusts at upstream sites.

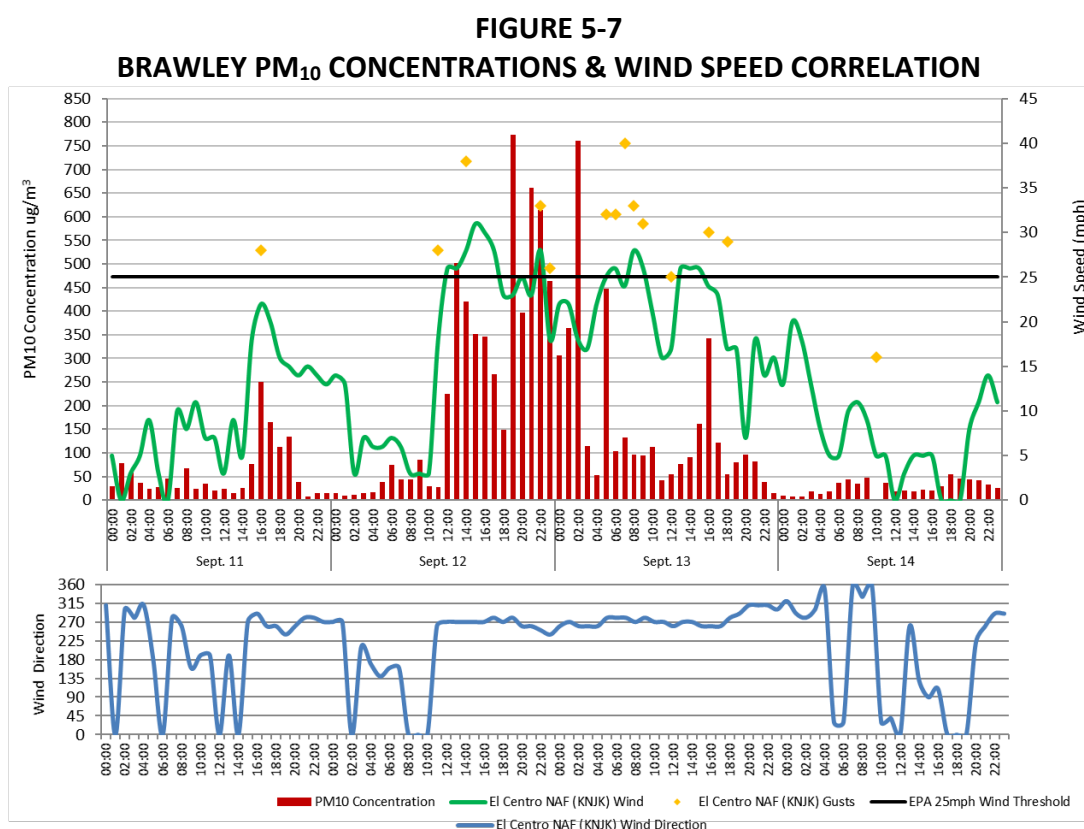


Fig 5-7: Fluctuations in hourly concentrations over 96 hours show a positive correlation with wind speeds, and particularly gusts, at Imperial County Airport (KIPL). The Brawley station does not measure wind. KIPL is slightly closer to Brawley than KNJK. Black line indicates 25 mph threshold. Air quality data from the EPA's AQS data bank. Wind data from the NCEI's QCLCD system

FIGURE 5-8
CALEXICO PM₁₀ CONCENTRATIONS & WIND SPEED CORRELATION

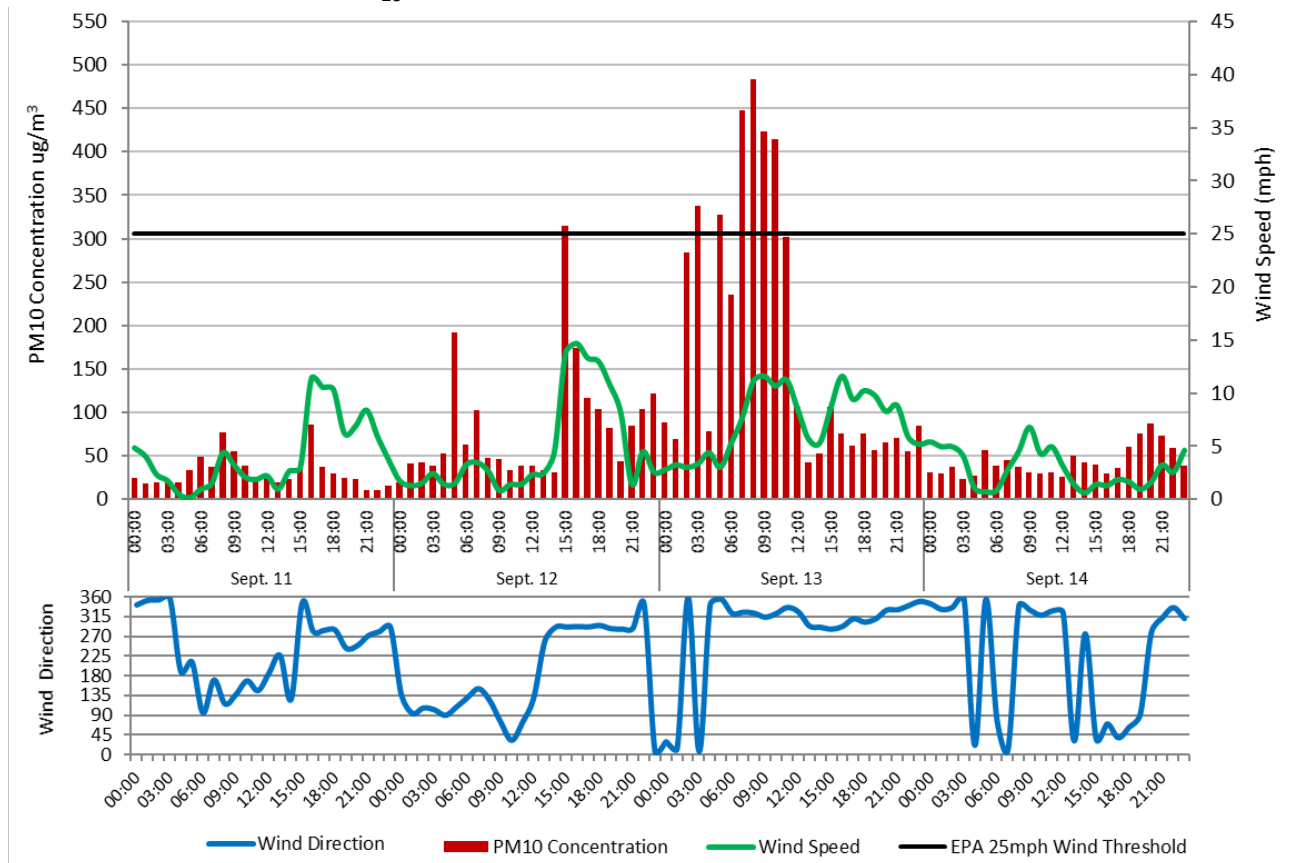


Fig 5-8: Measured winds at the Calexico station did not surpassed the 25mph threshold. However, the lesser speeds at Calexico allowed windblown dust from upstream to be deposited on the monitor. Black line indicates 25 mph threshold. Air quality and wind data from the EPA's AQS data bank

FIGURE 5-9
EL CENTRO PM₁₀ CONCENTRATIONS & WIND SPEED CORRELATION

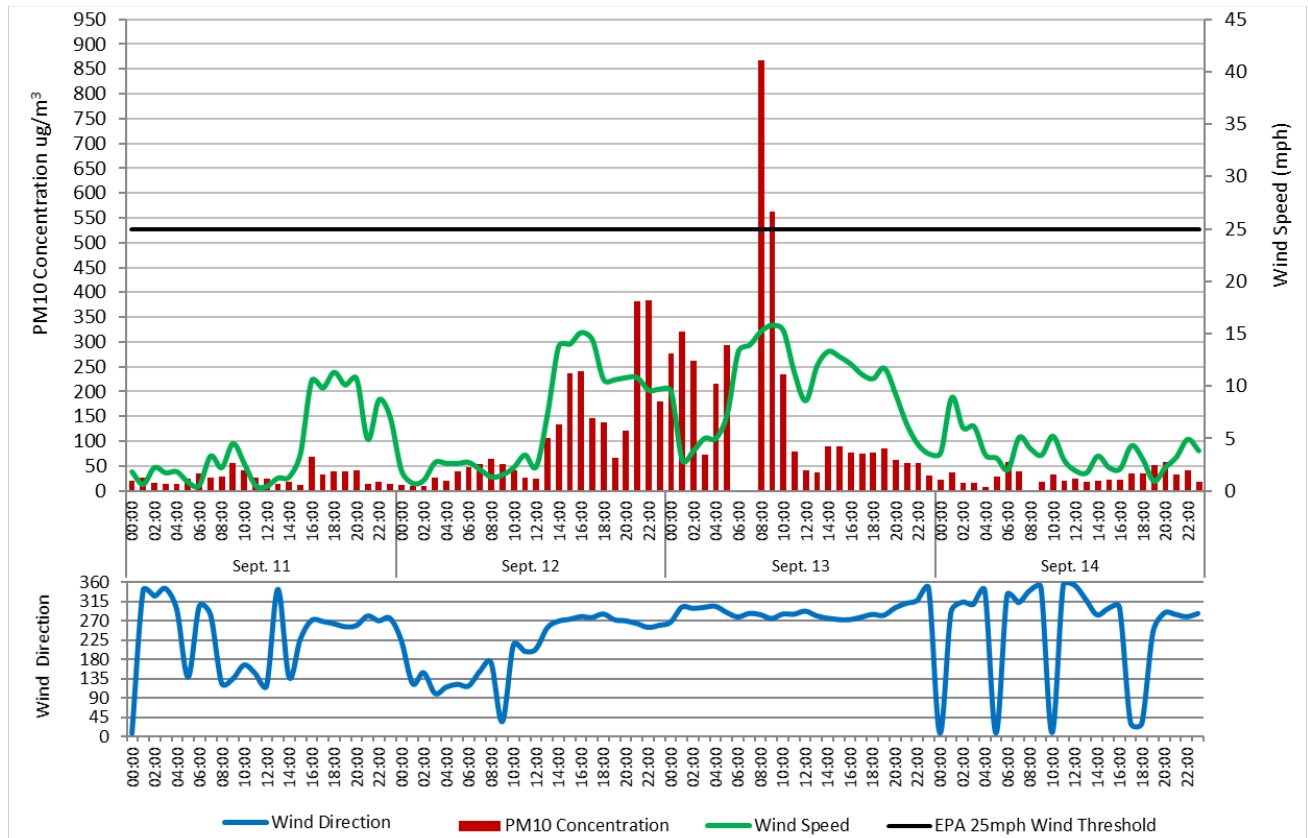


Fig 5-9: Measured winds at the El Centro station did not surpassed the 25mph threshold. However, the lesser speeds at El Centro allowed dust entrained upstream to be deposited on the monitor. Black line indicates 25 mph threshold. Air quality and wind data from the EPA's AQS data bank

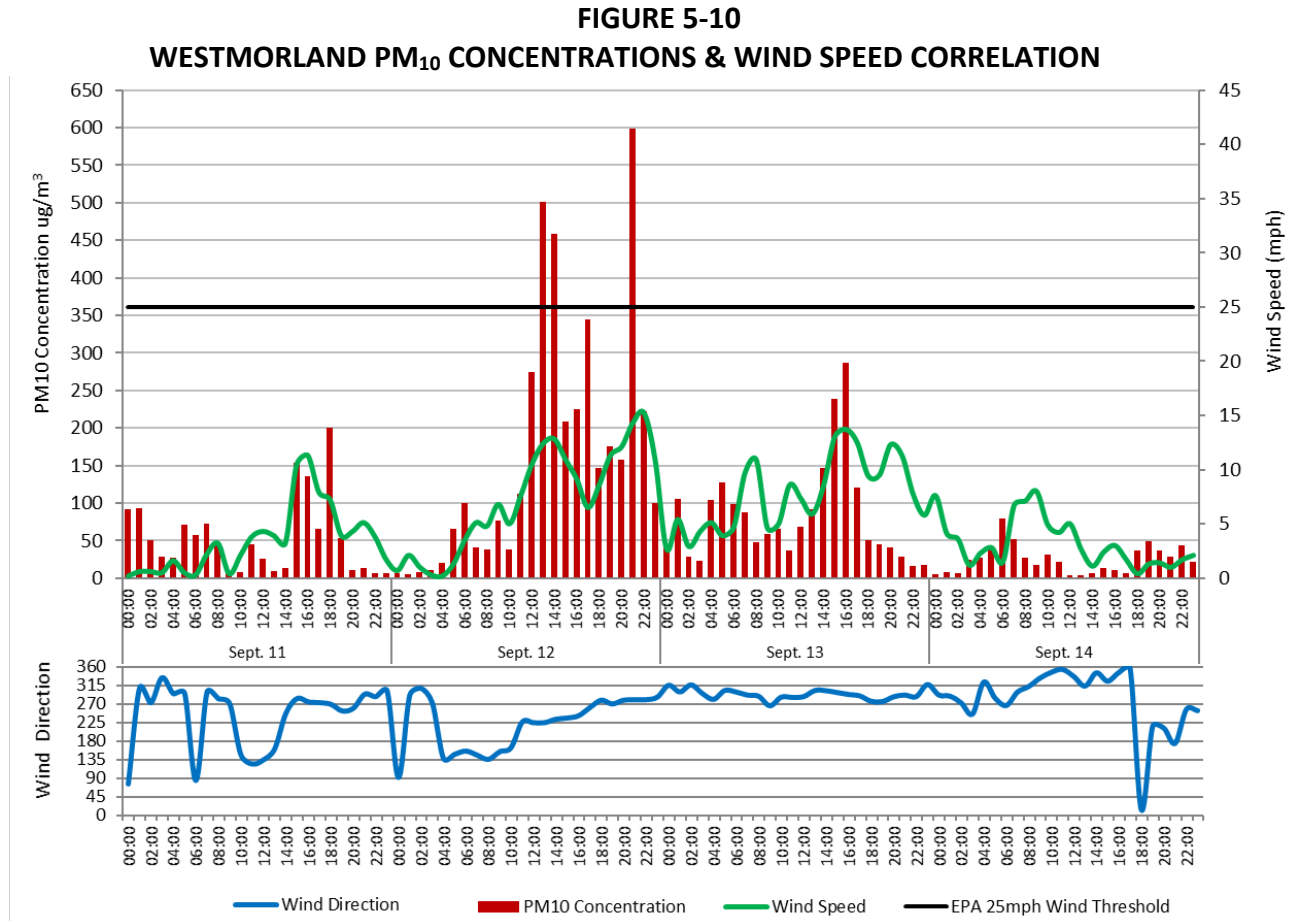


Fig 5-10: Measured winds at the Westmorland station did not surpassed the 25mph threshold. However, the lesser speeds at Westmorland allowed dust entrained upstream to be deposited on the monitor. Black line indicates 25 mph threshold. Air quality and wind data from the EPA's AQS data bank

Figure 5-11 depicts the relationship between the 96-hour PM₁₀ fluctuations by the Brawley, Calexico, El Centro, Niland, and Westmorland monitors together with upstream wind speeds. A positive correlation can be seen, between an increase in wind speeds and gusts with increased concentrations at the monitors. **Appendix C** contains additional graphs illustrating the relationship between PM₁₀ concentrations and wind speeds from region monitoring sites within Imperial County, eastern Riverside County, and Yuma, Arizona during the wind event.

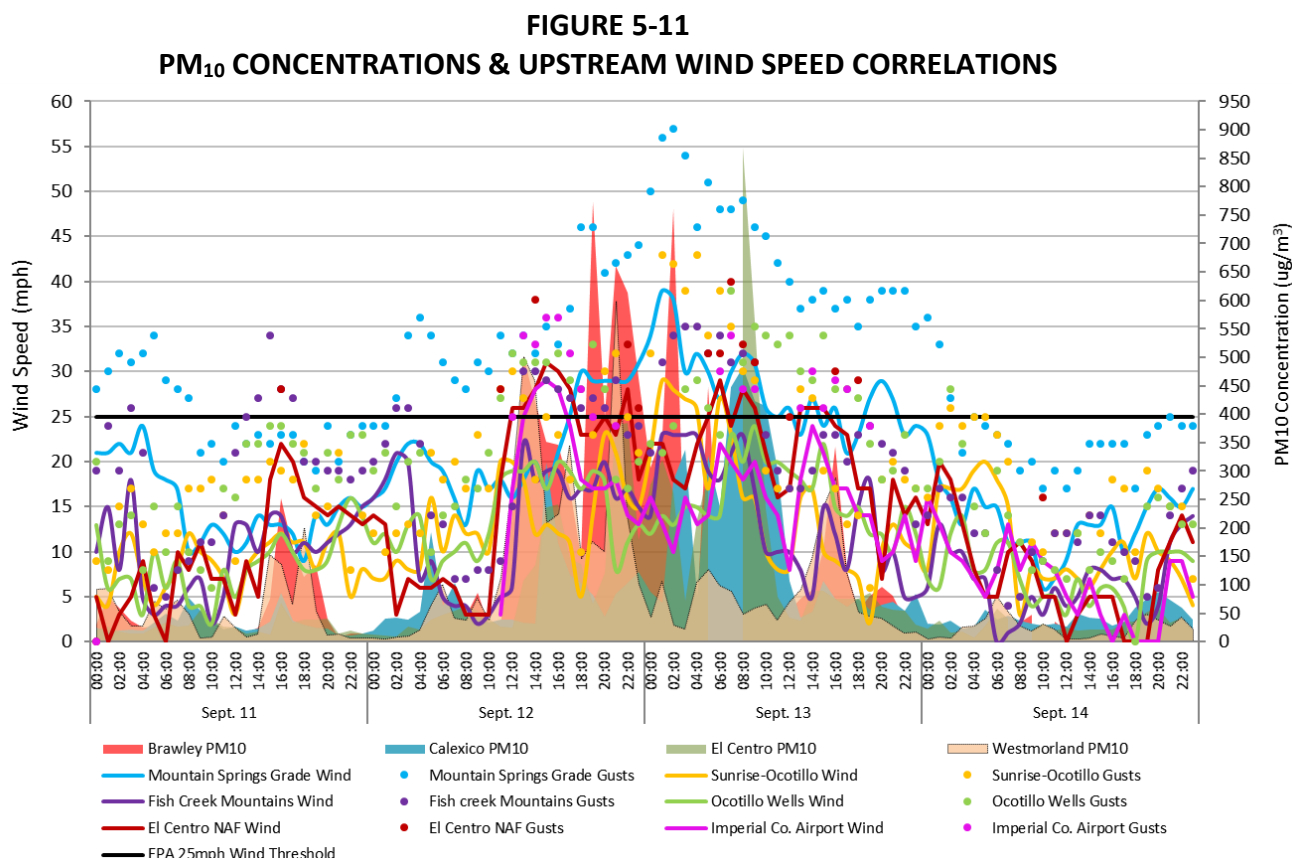


Fig 5-11: This graph depicts the 96-hour PM₁₀ fluctuations by the Brawley, El Centro, and Westmorland monitors together with upstream wind speeds. A positive correlation between an increase in wind speeds and elevated PM₁₀ concentrations can be seen, particularly with gusts. Black line indicates the 25 mph threshold. Due to the different times in which different sites sample wind speeds, the hour given is for the hour in which the sample was taken and not necessarily the exact time. Data from the University of Utah's MesoWest and the NCEI's QCLCD data bank

Figure 5-12 compares the 96-hour concentrations at Brawley, Callexico, El Centro, Westmorland, and Niland with visibility¹⁷ at local airports between September 11, 2016 and September 14, 2016. Generally, drops in visibility correspond to highest hourly concentrations at the monitors.

¹⁷ According to the NWS there is a difference between human visibility and the visibility measured by an Automated Surface Observing System (ASOS) or an Automated Weather Observing System (AWOS). The automated sensors measure clarity of the air vs. how far one can "see". The more moisture, dust, snow, rain, or particles in the light beam the more light scattered. The sensor measures the return every 30 seconds. The visibility value transmitted is the average 1-minute value from the past 10 minutes. The sensor samples only a small segment of the atmosphere, 0.75 feet therefore an algorithm is used to provide a representative visibility. Siting of the visibility sensor is critical and large areas should provide multiple sensors to provide a representative observation; <http://www.nws.noaa.gov/asos/vsby.htm>.

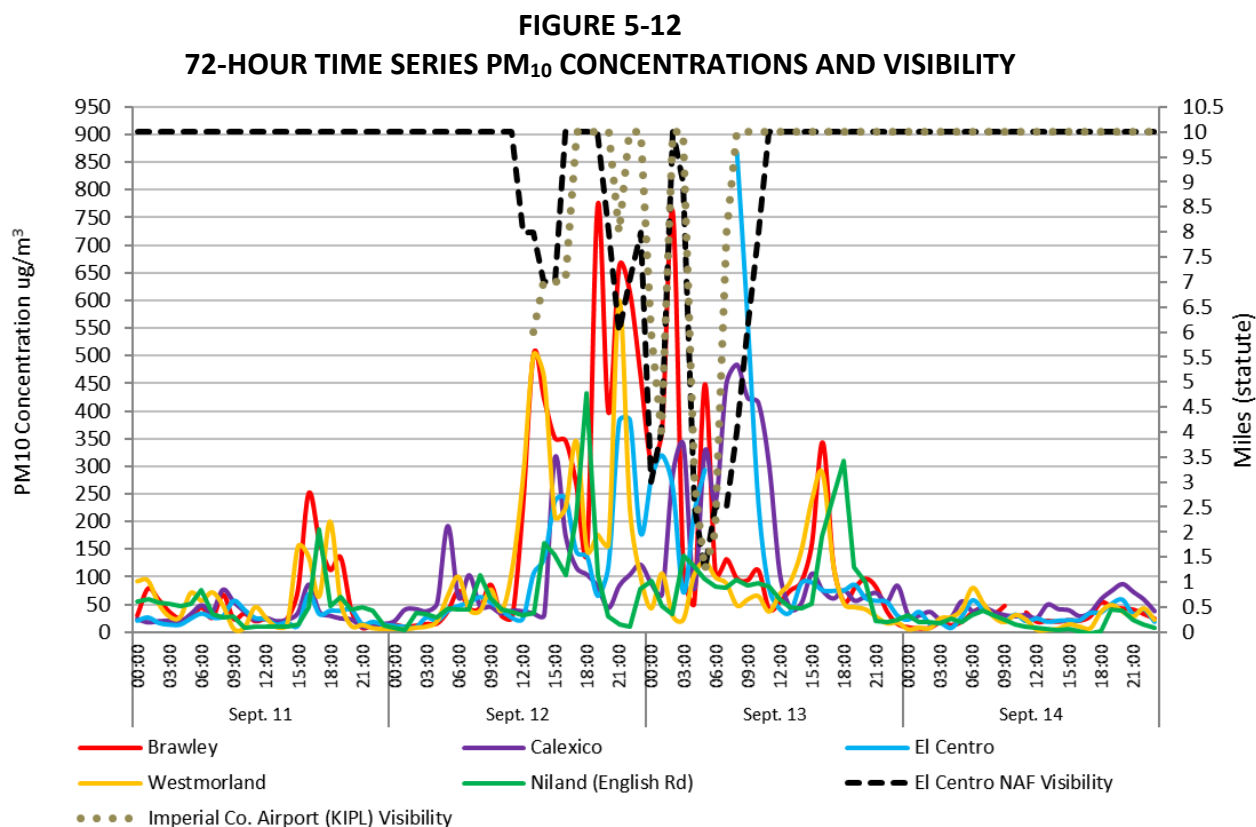


Fig 5-12: Visibility as reported from Imperial County Airport (KIPL) and El Centro NAF (KNJK) show that visibility dipped significantly at the airports coincident to peak concentrations at Brawley, Calexico, El Centro, Niland, and Westmorland. Visibility data from the NCEI's QCLCD data bank

As mentioned above the San Diego NWS office issued seven Urgent Weather message containing wind advisories September 12, 2016 and September 13, 2016. In addition, the San Diego NWS office issued a local storm report on September 13, 2016 for the Mountain Springs Grade area and two Public Statements late September 13, 2016. The documents confirmed wind speeds and gusts for Mountain Springs Grade above 45mph, Ocotillo Wells at 40mph, Borrego Springs at 39mph, Boulevard at 38mph and In Ko Pah at 36mph.

Figures 5-13 through 5-17 show the resulting air quality indices¹⁸ in Brawley, Calexico, El Centro, and Westmorland for September 12, 2016 and September 13, 2016, 2016. At Brawley (**Figure 5-13**) air quality was in the "Yellow" or Moderate category (PM₁₀ 51-100 $\mu\text{g}/\text{m}^3$) from 1 a.m. to 2

¹⁸ The AQI is an index for reporting daily air quality. It tells you how clean or polluted your air is, and what associated health effects might be a concern for you. The AQI focuses on health effects you may experience within a few hours or days after breathing polluted air. EPA calculates the AQI for five major air pollutants regulated by the Clean Air Act: ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide. For each of these pollutants, EPA has established national air quality standards to protect public health. Ground-level ozone and airborne particles are the two pollutants that pose the greatest threat to human health in this country. Source: <https://airnow.gov/index.cfm?action=aqibasics.aqi>.

a.m. and at a Moderate level from 2 p.m. through 9 p.m. At 10 p.m. air quality dropped further into the “Orange” or Unhealthy for Sensitive Groups level (PM₁₀ 101-150 µg/m³) where it stayed through the remainder of the day.

Air quality in Westmorland (**Fig. 5-14**) on September 12, 2016 was in the Good category until dropping into the Moderate level from 2 p.m. to 11 p.m. At 12 a.m. air quality slid into the Orange level.

Air quality in Imperial County was affected by suspended windblown dust from the previous day so much so that on September 13, 2016 Brawley’s air quality (**Fig. 5-15**) was already listed as Unhealthy for Sensitive Groups from 1 a.m. through 2 a.m. By 3 a.m. air quality dropped into the “Red” or Unhealthy category (PM₁₀ 151-200 µg/m³). It stayed there until 8p.m. when air quality rose back into the Orange level. Air quality in Calexico on September 13, 2016 was in the Yellow category from 1 a.m. to 9 a.m. At 10 a.m. it fell into the Orange level and remained there for the duration of the day. Air quality in El Centro was in the Yellow level from 1 a.m. to 6 a.m. At 7 a.m. it fell into the Orange level where it remained for the rest of the day.

At 11 p.m. on Monday, September 12, 2016, an air quality alert was issued for Brawley notifying the public that air quality was considered Unhealthy for Sensitive Groups. At 1 a.m. on September 13, 2016 an air quality alert was issued notifying the public that air quality was Unhealthy for Sensitive Groups. At 4 a.m. an air quality alert was issued notifying the public that air quality was now considered Unhealthy. Additional alerts were issued at 10 a.m., 1 p.m., 2 p.m. and 3 p.m. Overall, the September 12, 2016 and September 13, 2016 event affect air quality in Imperial County.

FIGURE 5-13
IMPERIAL VALLEY AIR QUALITY INDEX IN BRAWLEY
SEPTEMBER 12, 2016

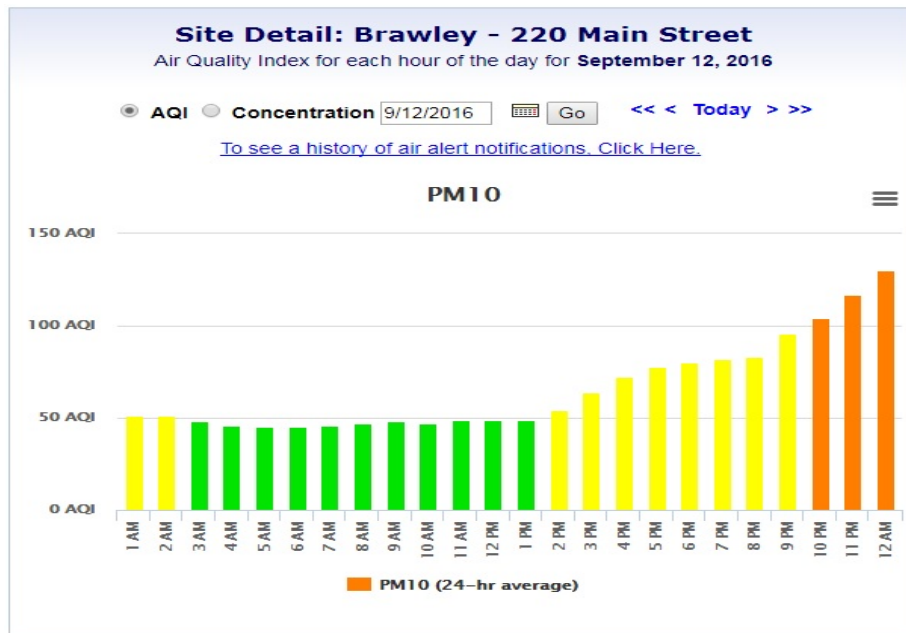


Fig 5-13: The reduced air quality in Brawley shows that the fugitive dust transported windblown by high winds impacted the air quality of the Imperial Valley. Source: ICAPCD archives

FIGURE 5-14
IMPERIAL VALLEY AIR QUALITY INDEX IN WESTMORLAND
SEPTEMBER 12, 2016

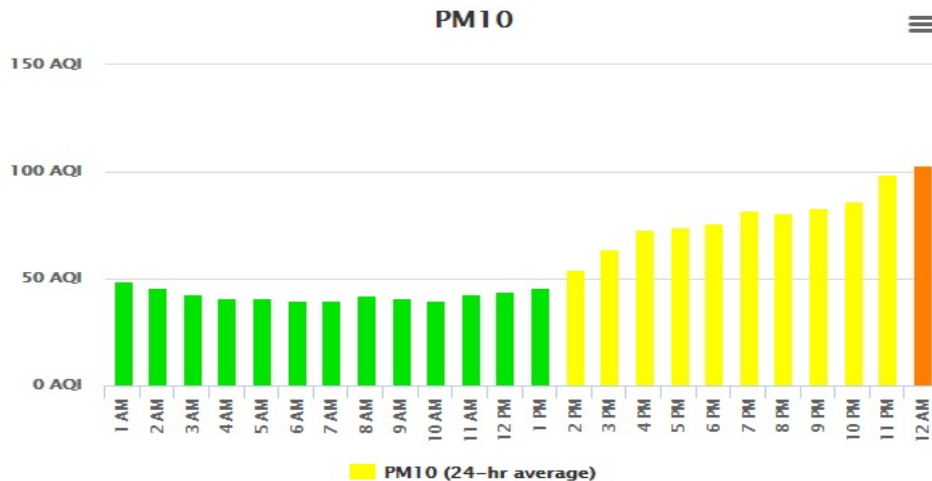


Fig 5-14: The reduced air quality in Westmorland shows that the fugitive dust transported windblown by high winds impacted the air quality of the Imperial Valley. Source: ICAPCD archives.

FIGURE 5-15
IMPERIAL VALLEY AIR QUALITY INDEX IN BRAWLEY
SEPTEMBER 13, 2016

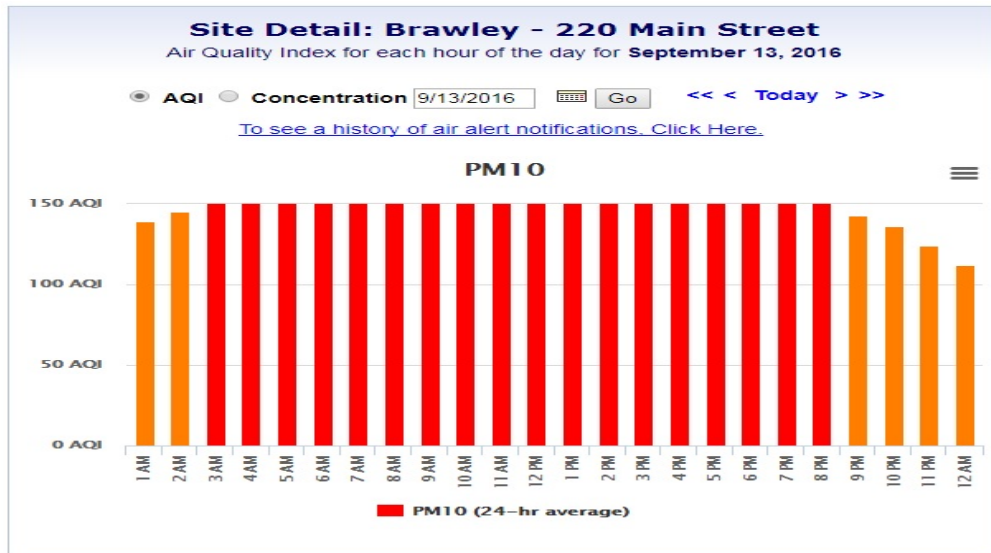


Fig 5-15: The reduced air quality in Brawley shows that the fugitive dust transported windblown by high winds impacted the air quality of the Imperial Valley. Source: ICAPCD archives

FIGURE 5-16
IMPERIAL VALLEY AIR QUALITY INDEX IN CALEXICO
SEPTEMBER 13, 2016

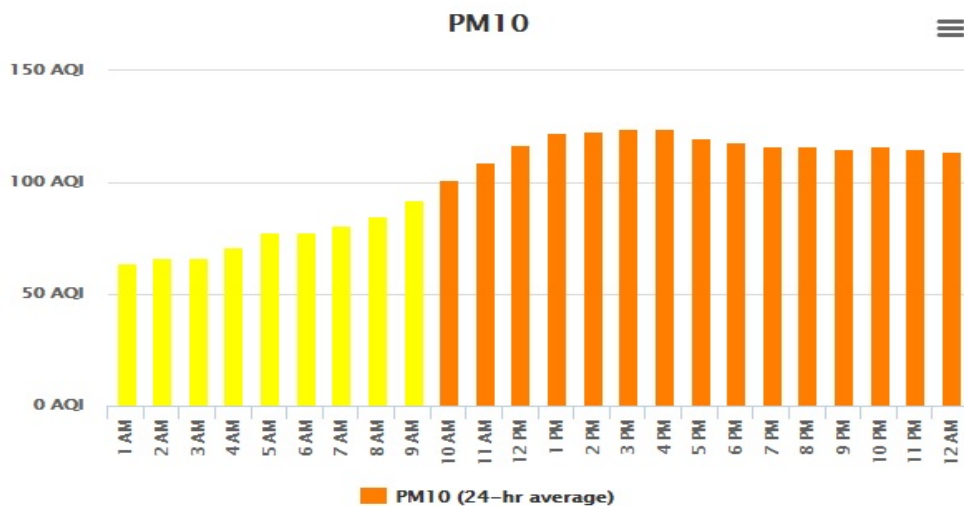


Fig 5-16: The reduced air quality in Calexico shows that the fugitive dust transported windblown by high winds impacted the air quality of the Imperial Valley. Source: ICAPCD archives

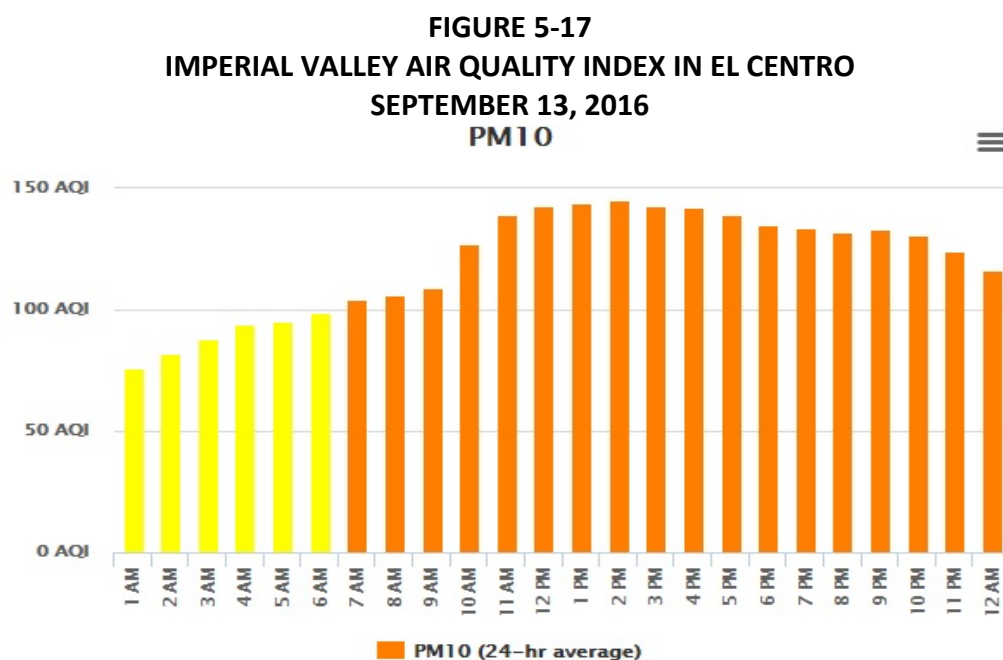


Fig 5-17: The reduced air quality in El Centro shows that the fugitive dust transported windblown by high winds impacted the air quality of the Imperial Valley. Source: ICAPCD archives

V.2 Summary

The preceding discussion, graphs, figures, and tables provide wind direction, speed and concentration data illustrating the spatial and temporal effects of the high winds associated with the strong low pressure system that moved through the region. The information provides a clear causal relationship between the entrained windblown dust and the PM₁₀ exceedance measured at the Brawley, Calexico, El Centro, and Westmorland monitors on September 12, 2016 and September 13, 2016. Furthermore, the advisories and air quality index illustrate the affect upon air quality within the region the mountains and desert slopes of San Diego County, all of Imperial County and the southern portion of Riverside County. Large amounts of coarse particles (dust) and PM₁₀ were transported by gusty southwest to west winds into the lower atmosphere causing a change in the air quality conditions within Imperial County. The windblown dust originated from as far as the mountains and desert slope areas located within San Diego County and Imperial Count (part of the Sonoran Desert). Combined, the information demonstrates that the elevated PM₁₀ concentrations measured on September 12, 2016 and September 13, 2016 coincided with high wind speeds and that gusty southwest to west winds were experienced over the southern portion of Riverside County, southeastern San Diego County, all of Imperial County, and parts of Arizona.

FIGURE 5-18
SEPTEMBER 12, 2016 AND SEPTEMBER 13, 2016 WIND EVENT TAKEAWAY POINTS

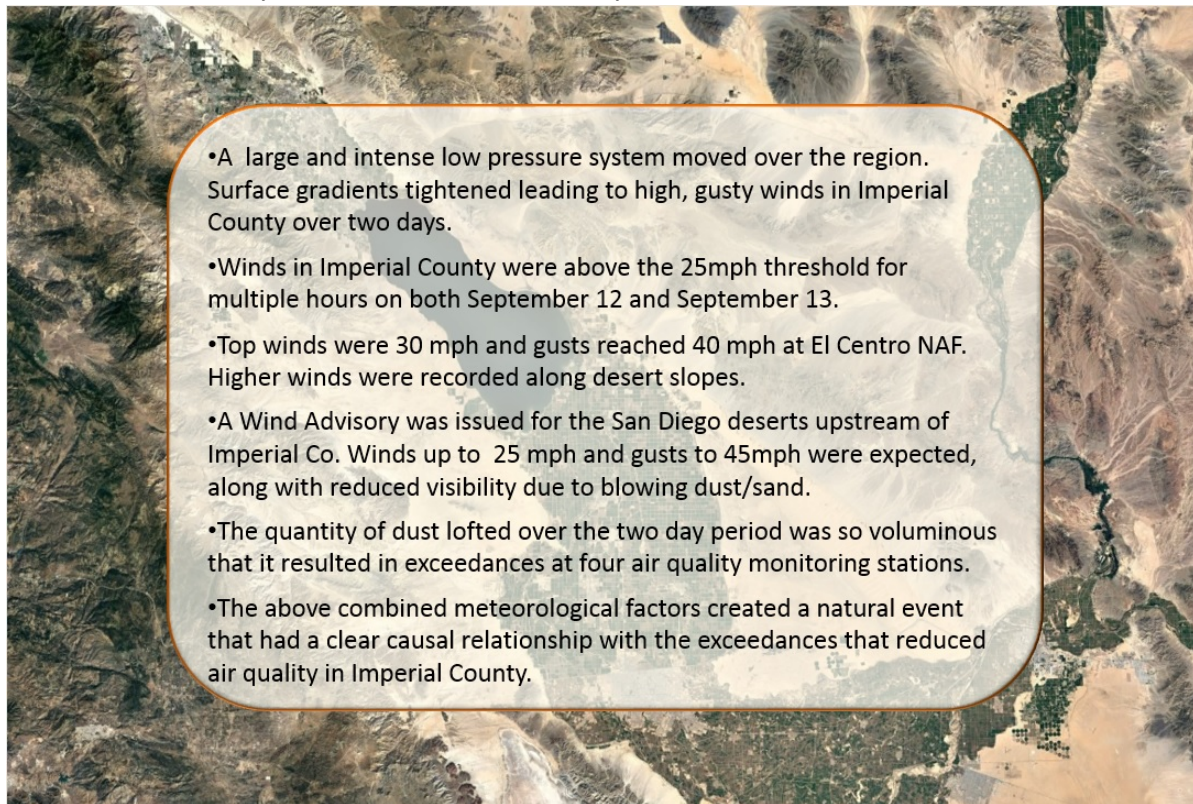


Fig 5-18: Illustrates the factors that qualify the September 12, 2016 and September 13, 2016 natural event which affected air quality as an Exceptional Event.

VI Conclusions

The PM₁₀ exceedance that occurred on September 12, 2016 and September 13, 2016, satisfies the criteria of the EER which states that in order to justify the exclusion of air quality monitoring data evidence must be provided for the following elements:

TABLE 6-1 TECHNICAL ELEMENTS CHECKLIST		
EXCEPTIONAL EVENT DEMONSTRATION FOR HIGH WIND DUST EVENT (PM ₁₀)		DOCUMENT SECTION
1	A narrative conceptual model that describes the event(s) causing the exceedance or violation and a discussion of how emissions from the event(s) led to the exceedance or violation at the affected monitor(s)	6-30; 76
2	A demonstration that the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation	52-74; 76
3	Analyses comparing the claimed event-influenced concentration(s) to concentrations at the same monitoring site at other times to support the requirement at paragraph (c)(3)(iv)(B) of this section	31-44; 76
4	A demonstration that the event was both not reasonably controllable and not reasonably preventable	45-51; 75
5	A demonstration that the event was a human activity that is unlikely to recur at a particular location or was a natural event	52-74; 76

VI.1 Affects Air Quality

The preamble to the revised EER states that an event is considered to have affected air quality if it can be demonstrated that the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation. Given the information presented in this demonstration, particularly Section V, we can reasonably conclude that there exists a clear causal relationship between the monitored exceedance and the September 12, 2016 and September 13, 2016 event, which changed or affected air quality in Imperial County.

VI.2 Not Reasonably Controllable or Preventable

In order for an event to be defined as an exceptional event under section, 50.1(j) of 40 CFR Part 50 an event must be “not reasonably controllable or preventable.” The revised preamble explains that the nRCP has two prongs, not reasonably preventable and not reasonably controllable. The nRCP is met for natural events where high wind events entrain dust from desert areas, whose sources are controlled by BACM, where human activity played little or no direct

causal role. This demonstration provides evidence that despite BACM in place within Imperial County, high winds overwhelmed all BACM controls where human activity played little to no direct causal role. The PM_{10} exceedance measured at the Brawley, Calexico, El Centro, and Westmorland monitors were caused by naturally occurring strong gusty southwest to west winds that transported fugitive dust into Imperial County and other parts of southern California from areas located within the Sonoran Desert regions to the west of Imperial County. These facts provide strong evidence that the PM_{10} exceedances at Brawley, Calexico, El Centro, and Westmorland on September 12, 2016 and September 13, 2016 were not reasonably controllable or preventable.

VI.3 Natural Event

The revised preamble to the EER clarifies that a “Natural Event” (50.1(k) of 40 CFR Part 50) is an event with its resulting emissions, which may recur at the same location, in which human activity plays little or no direct causal role. Anthropogenic sources that are reasonably controlled are considered not to play a direct role in causing emissions. As discussed within this demonstration, the PM_{10} exceedances that occurred at Brawley, Calexico, El Centro, and Westmorland on September 12, 2016 and September 13, 2016 were caused by the transport of fugitive dust into Imperial County by strong westerly winds associated with a low pressure system that moved over the region. At the time of the event anthropogenic sources were reasonably controlled with BACM. The event therefore qualifies as a natural event.

VI.4 Clear Causal Relationship

The time series plots of PM_{10} concentrations at Brawley, Calexico, El Centro, and Westmorland during different days and the comparative analysis of different monitors in Imperial and Riverside Counties demonstrates a consistency of elevated gusty southwest to west winds and concentrations of PM_{10} on September 12, 2016 and September 13, 2016 (Section V). In addition, these time series plots and graphs demonstrate that the high PM_{10} concentrations and the gusty southwest to west winds were an event that was widespread, regional and not preventable. Arid conditions preceding the event resulted in soils that were particularly susceptible to particulate suspension by the elevated gusty southwest to west winds. Days immediately before and after the high wind event PM_{10} concentrations were well below the NAAQS. Overall, the demonstration provides evidence of the strong correlation between the natural event and the entrained fugitive emissions to the exceedances on September 12, 2016 and September 13, 2016.

VI.5 Historical Concentrations

The historical annual and seasonal 24-hr average PM_{10} values measured at the Brawley, Calexico, El Centro, and Westmorland monitors were historically unusual compared to a multi-year data set (Section III).

Appendix A: Public Notification that a potential event was occurring (40 CFR §50.14(c)(1))

This section contains forecasts issued by the National Weather Service and Imperial County on or around September 12, 2016-13, 2016. The data show a region-wide increase in wind speeds and wind gusts coincident with the arrival of dust and high PM₁₀ concentrations in Imperial County.

Appendix B: Meteorological Data.

This Appendix contains the time series plots, graphs, wind roses, etc. for selected monitors in Imperial and Riverside Counties. These plots, graphs and tables demonstrate the regional impact of the wind event.

Appendix C: Correlated PM₁₀ Concentrations and Winds.

This Appendix contains the graphs depicting the correlations between PM₁₀ Concentrations and elevated wind speeds for selected monitors in Imperial and Riverside Counties. These graphs demonstrate the region wide impact of the wind event.

Appendix D: Regulation VIII – Fugitive Dust Rule.

This Appendix contains the compilation of the BACM adopted by the Imperial County Air Pollution Control District and approved by the United States Environmental Protection Agency. A total of seven rules numbered 800 through 806 comprise the set of Regulation VIII Fugitive Dust Rules.